A REVISION OF *MIRABILIS* SECTION *MIRABILIS* (NYCTAGINACEAE)

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ABSTRACT

The genus *Mirabilis* includes the formerly recognized genera *Allionia* in part, *Hesperonia*, *Oxybaphus* and *Quamoclidion*. It is comprised of about 60 species of tropical and temperate herbs distributed primarily in the Americas. Currently the genus is arranged in six sections, generally along the boundaries of the former genera. This study considers the section *Mirabilis*. Based on comparative morphology, including extensive field studies and observations in the greenhouse, scanning electron microsopy studies of pollen and fruit (anthocarp) characters, two species, *M. donahooiana*, *M. polonii* and one variety *M. sanguinea* var. *breviflora* are described as new. In addition, one new combination is proposed, *M. gracilis*.

RESUMEN

El género *Mirabilis* incluye los géneros anteriormente reconocidos *Allionia* en parte y *Hesperonia*, *Oxybaphus* y *Quamoclidion*. Está compuesto por aproximadamente 60 especies de plantas tropicales y clima templado, distribuido principalmente en las Américas. Actualmente el género está organizado en seis secciones generalmente dentro de los límites del anterior género. Este estudio considera la sección *Mirabilis*. Está basado en morfología comarativs, incluyendo estudios extensivos de campo, observaciones en invernadero, caracteristicas del polen y fruto (antocarpo) estudiadas con microscopía electrónica, se describen dos nuevas especies *M. donahooiana*, *M. polonii* y una variedad *M. sanguinea* var. *breviflora*. Además se propone una nueva combinación: *M. gracilis*.

The genus *Mirabilis*, in the family Nyctaginaceae, comprises approximately 60 species distributed primarily in tropical and temperate regions of the Americas. A large number of species are centered in the warm temperate regions, especially the deserts, of North America. Several species occur in Mesoamerica, some of these extend into northern South America, while other species are exclusively South American. One species, *M. himalaica* (Edgew.) Heimerl is reported from the Himalayas, the only species native outside of the western hemisphere. Several of the American species are common and widespread; others appear as localized endemics. Historically, generic and specific delimitations of *Mirabilis* have varied. *Mirabilis* was formally proposed by Linnaeus in 1753. The first synopsis of the genus was provided by Choisy (1849). He recognized in the genus *Mirabilis* only

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species which today are included in *Mirabilis* section *Mirabilis*. His treatment regarded as distinct the genera *Quamoclidion* Choisy and *Oxybaphus* L'Her. The treatment by Asa Gray (1859) recognized only *Mirabilis* and *Oxybaphus* as distinct genera. Gray separated *Mirabilis* (incl. *Quamoclidion*) and *Oxybaphus* on characters of the involucre, stamen number, and fruit. Beginning in 1889, Dr. Anton Heimerl of Vienna, probably the foremost authority on this group, contributed several excellent discussions and treatments, in over four decades of study (1889, 1897, 1934). Standley (1909) considered Heimerl's treatment of *Mirabilis* to be exceedingly conservative, largely because the latter considered the long recognized genus *Allionia* Loefl. (*Oxybaphus*) to be only a section of *Mirabilis*. Standley's treatment (1909, 1911, 1918) of the North American species used characters of fruit, involucre, and flowers to recognize *Allionia*, *Allioniella* Rydb., *Quamoclidion Hesperonia* Standley, and *Mirabilis* as genera. However, by the 1930s both Standley (1931a, 1931b) and Heimerl (1934), recognized but a single genus, *Mirabilis*. Standley, reflecting on his new treatment, said, "If only the species of North America are considered, such genera as *Oxybaphus*, *Quamoclidion*, and *Hesperonia* seem to be differentiated by good and constant characters, but as so often happens, when extralimital species are taken into account, the characters supposed to separate the groups break down. It seems necessary, therefore, to follow Heimerl in considering all the plants of the group as representing a single genus." Most subsequent workers in North America, and several workers before Standley's time (Gray 1859; Jepson 1914; Macbride 1918), have recognized the segregate genera, albeit as subgenera within an expanded *Mirabilis*. Shinners (1951) considered the species of *Oxybaphus* to be quite distinct, but satisfactory as a subgenus of *Mirabilis*. Pilz (1978) maintained *Quamoclidion* as a subgenus, but reduced the heretofore regarded monotypic genus *Hermidium* S. Wats., to subgeneric rank within *Mirabilis*.

The results of this study and additional studies by the author (Le Duc 1993) support the aforementioned expanded genus *Mirabilis*. However, after spending three summers in the field in Mexico (from Neuevo Leon to Chiapas) and day to day observations of collected plants grown in the greenhouse for four years, I support a sectional treatment. No set of characters is distinctive enough to elevate any section to subgeneric level when such species as *M. triflora*, *M. exserta*, *M. urbanii*, and *M. sanguinea* are taken into account.

Mirabilis L., Sp. Pl. 1:177. 1753. *Nyctago* Juss., Gen. 90. 1789. TYPE: *Mirabilis jalapa* L.

Herbaceous perennials, stems erect, semidecumbent or decumbent, simple or branched from the base, with a pseudodichotomous branching

pattern; roots often tuberous. Leaves opposite, petiolate or sessile, the blades variously shaped, linear, lanceolate, ovate, obovate, cordate or round, glabrous or pubescent, some glandular, green or glaucous. Flowers axillary or in terminal inflorescences, or both. Involucres 1-many flowered, 5-lobed, sometimes enlarged and membranous in fruit. Perianth constricted above the ovary, the tube campanulate, funnelform or salverform. Stamens 3–6, unequal in length, filiform, incurved, united at the base into a fleshy cup around the ovary. Anthocarps usually 5-angled or 5-ribbed, glabrous or pubescent. Perisperm mealy. Base chromosome numbers, reportedly x = 26, 29, 33.

Adapting Hooker's (1880) treatment, Heimerl (1934) defined six sections of the genus *Mirabilis* as follows:

1. Section *Mirabilis.* Involucres ± narrowly campanulate, 1-flowered, slightly accrescent in age. Perianth conspicuous, funnelform or nearly (tubular) salverform, the limb expanded. Stamens 5. Anthocarps ellipsoid, ± pubescent, ± angular or ribbed, surface smooth or warty, not mucilaginous when wet (*Mirabilis* sensu stricto).

2. Section *Watsoniella.* Involucres ± narrowly campanulate, 1-flowered, lobes unequal in length, slightly accrescent in age. Perianth slender, the tube becoming wider above, the margin plain, scarcely lobed. Stamens 3. Anthocarps ellipsoid, short hairs, 5 obtuse ribs, tuberculate, constricted at the base (monotypic *M. watsoniana* Heimerl).

3. Section *Quamoclidion* (*Paramirabilis*). Involucres broadly campanulate, 2–12 flowered, slightly accrescent in age. Perianth broadly funnelform to funnelform-campanulate, the tube consistently longer than broad, deeply constricted just above the ovary, the limb expanded. Stamens 5. Anthocarps obovoid, ellipsoid to almost spheroid, consistently glabrous. (Hiemerl excluded *M. triflora*.) Following the Int. Code of Botanical Nomenclature (1989), Article 22, Section *Paramirabilis* of Heimerl becomes Section *Quamoclidion*, the first valid publication at the sectional level (Hooker 1880).

4. Section *Mirabilopsis*. Involucres broadly campanulate, 2–3 flowered, slightly accrescent in age. Perianth campanulate-funnelform, consistently longer than broad, deeply 5-lobed. Stamens 4–5. Anthocarps obovoid, obtuse apex, obtuse ribs and narrow furrows, fine pubescence, mucilaginous when wet (monotypic *M. coccinea* (Torr.) Hook.).

5. Section *Oxybaphus.* Involucres campanulate 2–3(–1) flowered, very accrescent, membranous, flattened, lobes equal in age. Perianth campanulate, funnelform or almost rotate (deeply constricted just above ovary), the tube lacking or very short. Stamens 3–5. Anthocarps ellipsoid, obovoid or clavoid, 5 ± strong ribs, mostly pubescent, base truncate, mucilaginous when wet (incl. *Allionia* in part).

6. Section *Oxybaphoides.* Involucres campanulate, 1-flowered, lobes equal,

only slightly accrescent in age. Perianth campanulate, funnelform or almost rotate, (deeply constricted just above ovary), the tube lacking or very short, seldom narrowly campanulate. Anthocarps ellipsoid or obovoid, surface nearly always glabrous, rough or somewhat angled, mucilaginous when wet (incl. *Oxybaphus* in part, *Hesperonia*, & *Allioniella*).

KEY TO SECTIONS OF THE GENUS *MIRABILIS*

1. Involucre 1-flowered, only slightly enlarged in fruit.
   2. Anthocarp mucilaginous when wet; suffruticose perennials; roots not tuberous. ..... Section *Oxybaphoides*
   2. Anthocarp not mucilaginous when wet; perennials; roots tuberous.
      3. Stamens 3; perianth limb not noticeably lobed. ..... Section *Watsoniella*
      3. Stamens 5; perianth limb distinctly 5-lobed, (*M. hintoniorum* only shallowly lobed.) ..... Section *Mirabilis*
1. Involucre 2–3-flowered or more, sometimes much enlarged in fruit.
   4. Anthocarp ellipsoid, obovoid or clavoid, glandular or nonglandular pubescent, mucilaginous when wet.
      5. Involucre only slightly enlarged and not membranous in fruit; stamens 5. ..... Section *Mirabilopsis*
      5. Involucre very enlarged and membranous in fruit; stamens 3 or 5. ..... Section *Oxybaphus*
   4. Anthocarp obovoid, ellipsoid to spheroid, glabrous, mucilaginous when wet, or not. ..... Section *Quamoclidion*

The purpose of this treatment is to provide a difinitive means of identification and circumcription of the species of section *Mirabilis*. These species are characterized by single-flowered involucres only slightly accrescent after anthesis, the perianth conspicuous with limb expanded, and five stamens. This study recognizes ten species within the section, two species, a variety newly discribed herein and a variety elevated to specific level. The native distribution is prodominently in Mexico the exception *Mirabilis longiflora* var. *urightiana* is also found in the Mountain regions of southern Arizona, southern New Mexico and extreme western Texas. Habitat is mainly disturbed or open areas in subtropical deciduous and scrub vegetation. Again, *M. longiflora* var. *urightiana* differs, it has a desert to juniper woodland habitat. *Mirabilis jalapa*. the common Four O' clock, widely used as a garden plant by the Pre-Columbian people of Mexico and Europeans, has become a weed in many areas of the world.

MORPHOLOGY

The morphological characters of taxonomic significance within the section *Mirabilis* include: stem size, internodal length; leaf blade shape and attachment; pubescence; inflorescence structure; involucre shape during anthesis and maturation of the anthocarp; perianth shape and color; stamen length and color, and anthocarp shape, topography and indumentum.

Section *Mirabilis* is comprised of perennials which grade from herbaceous to suffruticose. Most species have erect or ascending branches. Occasionally, branches of *M. longiflora*, *M. sanguinea*, *M. urbanii* are slender and only weakly ascending to semidecumbent. In well established plants, lower stems may be very stout, 4–6 cm in diameter particularly with *M. gracilis*, *M. jalapa*, and *M. polonii*. All species have a pseudodichotomous branching pattern with swollen nodes bearing a transverse line of puberulence. Internode length varies from 5–7 cm long in *M. urbanii* to 13–23 cm in *M. sanguinea*, with most species having internodes ranging from 7–12 cm in length. Plant height usually varies from ca. 2 dm for *M. sanguinea* and *M. urbanii* to ca. 1.5 m for *M. gracilis* and *M. jalapa*. All species have swollen, fleshy, tuberous roots which range from 3.5–4.0 cm in diameter and ca. 12 cm long in seedlings, to 3 dm diameter and 6–8 dm length in older established plants of *M. gracilis*, *M. jalapa*, *M. longiflora*, and *M. pringlei*. A caudex, 1–8 cm long, may develop above the tuberous root of very mature plants. Leaves are opposite and quite variable in size, large leaves (9–15 cm long) of lower stems to small leaves (2–6 cm long) subtending the inflorescences. Leaf size is greatly effected by environmental conditions. Leaves that subtend the inflorescences often are quite reduced and lanceolate in *M. longiflora*, *M. sanguinea*. Petiole length also decreases toward the shoot tips, with the uppermost leaves sessile or subsessile in *M. exserta*, *M. hintoniorum*, *M. longiflora*, *M. urbanii*. Blade outline of most species is ovate to deltoid, bases vary from cordate in *M. exserta*, *M. longiflora*, *M. pringlei* to truncate or subtruncate and asymmetrical in *M. donahooiana*, *M. gracilis*, *M. polonii* to asymmetrical with the blade grading down the petiole in *M. urbanii*. Leaf apex may be short-acute *M. exserta*, *M. longiflora*, *M. pringlei* or long-attenuate *M. donahooiana*, *M. gracilis*, *M. jalapa*, *M. polonii*. Pubescence is almost always found on the veins of the upper surface, and may be present on the lower surface as well in *M. longiflora* var. *longiflora*, *M. pringlei*, *M. sanguinea* var. *sanguinea*, *M. urbanii*. The absence of pubescence on the undersurfaces of *M. longiflora* var. *urightiana* and *M. sanguinea* var. *breviflora* is a distinguishing feature. Terminal multiple cymose inflorescences vary from open in *M. exserta*, *M. hintoniorum*, *M. pringlei* to aggregate or glomerate *M. jalapa*, *M. longiflora* var. *longiflora*, *M. sanguinea*. Often, however, the first flowers are solitary and axillary. The peduncles are pubescent, often densely so in *M. donahooiana*, *M. exserta*, *M. longiflora*, *M. polonii*, *M. pringlei*, *M. sanguinea*, *M. urbanii*. This pubescence is predominantly glandular in *M. exserta*, *M. longiflora*, *M. pringlei*. Flowers are perfect, involucrate, with one flower per involucre. The five-lobed involucre appears as a false calyx under a petaloid perianth. This gives the flower every appearance of having a symsepalous calyx and a sympetalous corolla. All species have similar campanulate or narrowly campanulate involucres with 5 lobes as long as,

or slightly longer than, the fused portion. Involucres, of all species, are only slightly accrescent in age but display variation in shape at anthocarp maturity. Some involucres are rotate *M. gracilis*, *M. jalapa* and some are campanulate *M. polonii*, *M. pringlei*, *M. sanguinea*, *M. urbanii*. In *M. longiflora*, the involucral lobes are extremely attenuate and valvate until well after the anthocarp has matured. The perianth is composed of a showy petaloid calyx (Joshi & Rao 1934) at least twice as long as the involucre. It consists of three sections: the base which is constricted above the ovary, the tube, and the limb (the basal portion persists and encloses the ovary to become the fruit or anthocarp, the tube and limb abscise at the constriction point and fall off after pollination). The tube in most species is funnelform, though in some it is narrowly so, *M. donahooiana*, *M.exserta*, *M. jalapa*, *M. sanguinea* var. *sanguinea:* others are distinctly salverform *M. gracilis*, *M. longiflora*, *M. polonii*. Perianth color ranges from white in *M. gracilis*, *M. longiflora*, *M. polonii* to pink in *M. exserta*, *M. pringlei*, *M. urbanii* to lavender, purple and red in *M. donahooiana*, *M. jalapa*, *M. sanguinea*. Orange appears only in *M. hintoniorum* and among occasional populations of *M. jalapa*. The perianth limb terminates in five nearly equal usually broadly obtuse lobes with emarginate apices and five nerves which extend along the tube and limb to terminate in tuffs of pubescence. These lobes are induplicate and plicate in bud. *Mirabilis pringlei* has distinctive acute triangular lobes and *M. hintoniorum* has very obscure lobes. In *M. exserta*, *M. gracilis* the shallow emarginate lobes give the perianth limb a ruffled appearance. All species have circinate stamens that are united at the base, forming a collar around the single ovary. This collar may completely contain the ovary in *M. longiflora* and *M. pringlei* or expose as much as the upper 2/3 of the ovary as in *M. urbanii*. Above the collar, stamens are free, though most are appressed to the perianth in the region of constriction, and some remain appressed part way up the perianth tube, *M. gracilis*, *M. polonii*. Stamens are usually unequal in length with presentation to one side of the perianth creating a weakly zygomorphic flower. Filaments of most species are lavender to lavender-pink, except *M. hintoniorum* and the yellow and white flowering forms of *M. jalapa*, which have filaments the same color as the perianth. In most species, the stamens are well-exserted beyond the throat of the perianth tube, the exceptions: *M.donahooiana*, *M. urbanii*, many populations of *M. jalapa*, and some populations of *M.longiflora* var. *longiflora*. Pollen grains are spheroidal, pantoporate, and the sexine sparsely tubuliferous and spinulose. They range in size from 100 mm to 190 mm, (to 210 mm, according to Nowicke 1970). The ovary is superior with a single ovule. The capitate stigma and style, which are longer than the stamens, often remain extended in senescent flowers. The fruit or anthocarp formed from the persistent basal portion of the perianth and the enclosed ovary, may be spheroid,

elliptic, or oblong; 5-angled or ribbed; glabrous or pubescent; smooth or warty; black, light brown, brown, or orangish brown. In a survey study of *Mirabilis* anthocarps (forty of the sixty taxa) (Le Duc 1993) no other section displayed as much variablility of anthocarp characters between species as did section *Mirabilis*. The glabrous, elliptic anthocarp with five to ten furrows of *M. exserta*, is similar to several species of section *Quamoclidion* (Plate I–4). The anthocarps of *M. hintoniorum*, *M. sanguinea*, and *M. urbanii* (Plate II–1, 2, 3 & 4) are oblong-ellipsoid, pubescent, 5-angled, ridges tuberculate, with a truncate base and an acute apex. These features are commonly associated with species in section *Oxybaphus*. The other entities of section *Mirabilis* (Plate I–3, 5 & 6; Plate II–5, 6, 7) display various combinations of characters intermediate between the afore described species. One significant character distiguishes all species of section *Mirabilis* from the other sections, a lack of any mucilage production when the anthocarps are wet. (Section *Quamoclidion* includes the only other species that reportedly do not produce mucilage when wet, but it also includes several species that become mucilaginous.) For most individual species in section *Mirabilis* the anthocarpal features remain quite constant. However, considerable variation exists in the two species that are known to have been cultivated as garden plants, first by the Pre-Columbia people, and then by the Europeans, *M. jalapa* and *M. longiflora*. Plate I–1 & 2 and 3 & 5 show two common forms for each of these species.

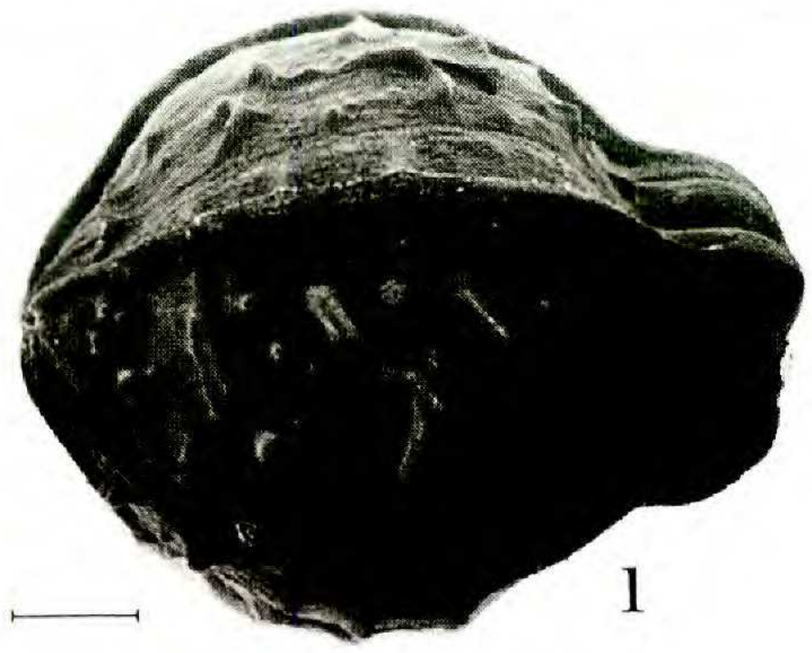
TAXONOMIC TREATMENT

Section **Mirabilis** Hook., in Benth. & Hook., Gen. Pl. 3:1–11. 1880. TYPE: *Mirabilis jalapa* L.

Herbaceous or suffruticose perennials, erect, ascending or semidecumbent, the root fleshy, the stems slender or stout, puberulent or glabrous. Mid-stem leaves opposite, petiolate; blade thin or slightly succulent, ovate to broadly so; base cordate, truncate or grading into the petiole, veins prominent. Involucres 1-flowered, ± narrowly campanulate, 5-lobed, slightly accrescent in age. Perianth showy, funnelform or nearly salverform, limb with 5 emarginate lobes. Stamens 5, circinate before anthesis, the filaments unequal, capillary, connate at base into a sheath about the ovary. Anthocarp ellipsoid, ± pubescent or glabrous, ± angular or ribbed, surfaces smooth or warty. Not mucilaginous when wet. Base chromosome number possibly x = 29.

KEY TO SPECIES OF SECTION *MIRABILIS*

1. Stamens exserted, filaments at least twice as long as perianth.
   2. Perianth tube slightly swollen above the ovary, the lobes acute. ..... 1. *M. pringlei*
   2. Perianth tube not swollen above the ovary, the lobes obtuse.
      3. Anthocarp broadly ellipsoid or ovoid, glabrous; perianth white, pink-tinged to pale lavender. ..... 2. *M. exserta*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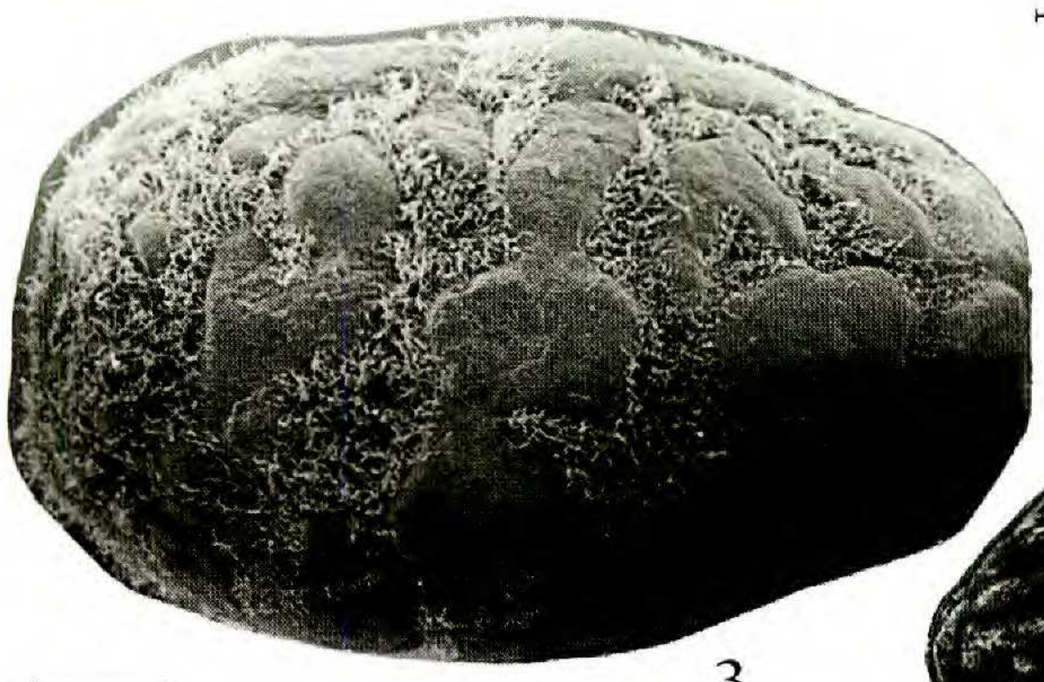
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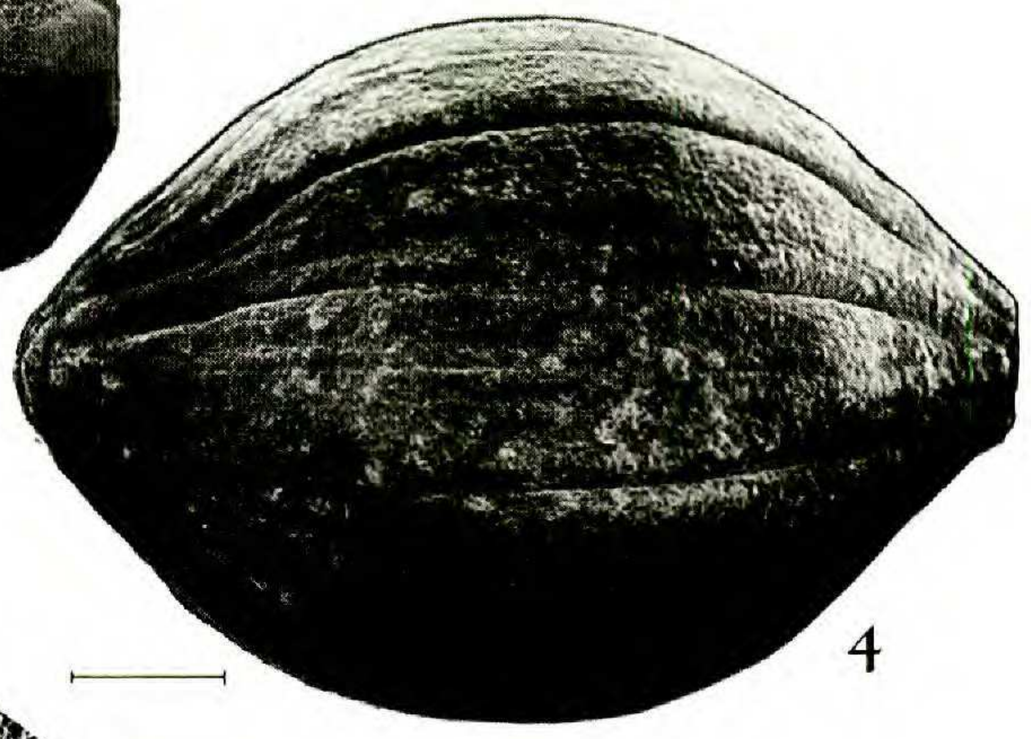
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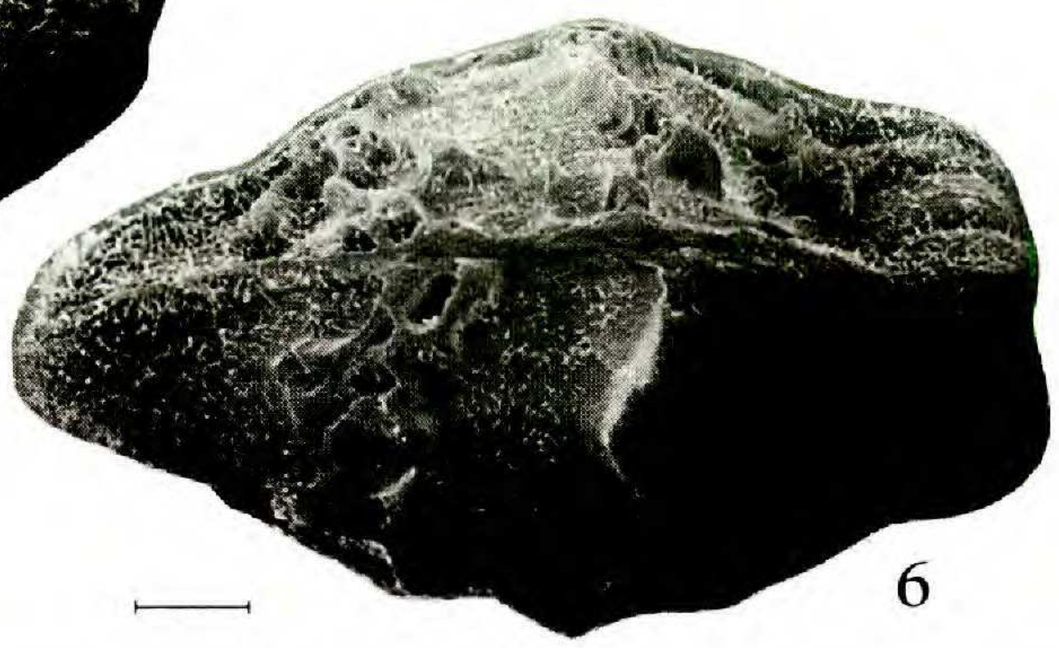
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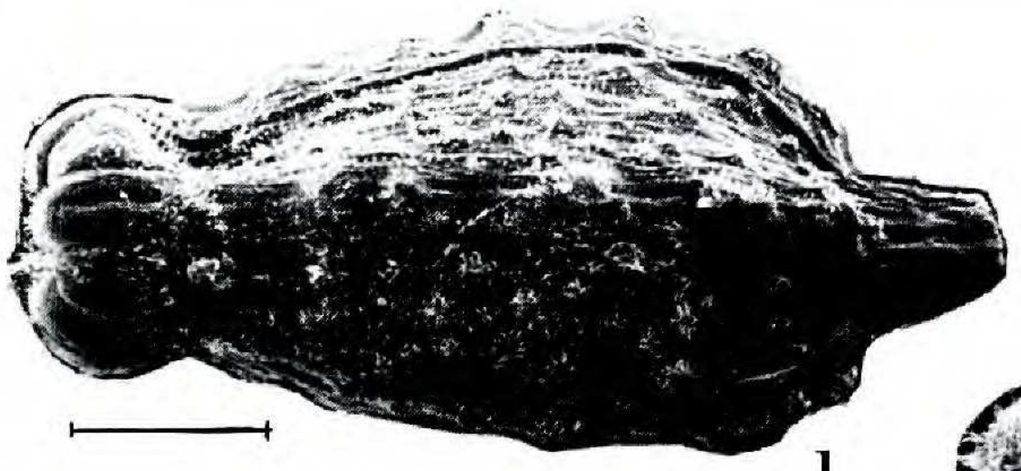
PLATE I. 1. *M. jalapa*—Mexico, Veracruz. *Le Duc & Sydor 158* (TEX). 2. *M. jalapa*—Texas, Travis Co. *Le Duc s.n.* (TEX). 3. *M. longiflora* var *longiflora*—Mexico, Tlaxcala. *Le Duc 222* (TEX). 4. *M. exserta*—Mexico, Baja California Sur. *Breedlove 43339* (MO). 5. *M. longiflora* var *wrightiana*—Mexico, Durango. *Le Duc 180* (TEX). 6. *M. gracilis*—Mexico, Jalisco. *Le Duc & Sydor 71* (TEX). Bar = 1.0 mm.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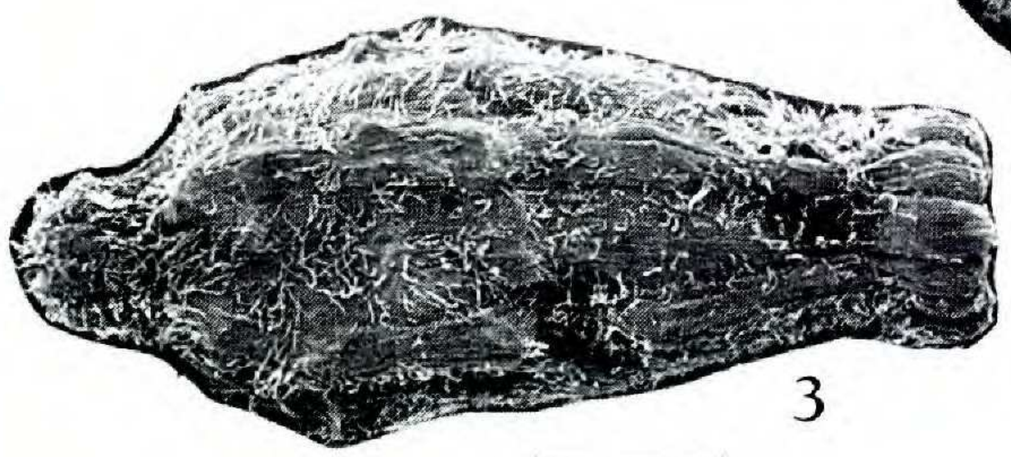
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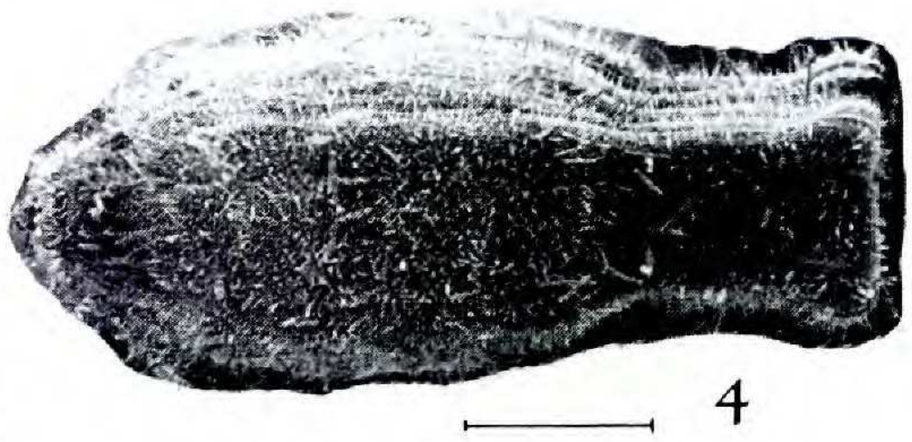
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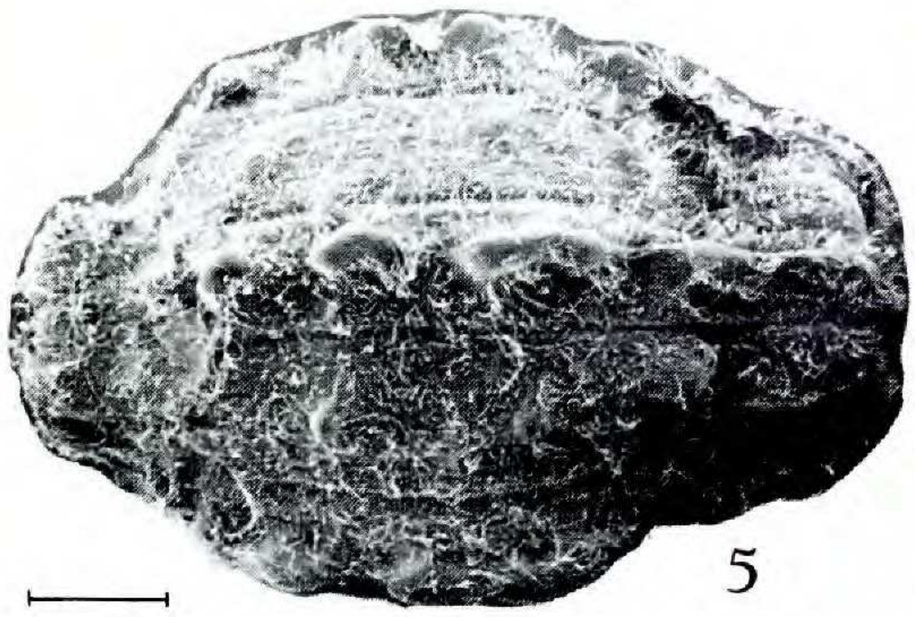
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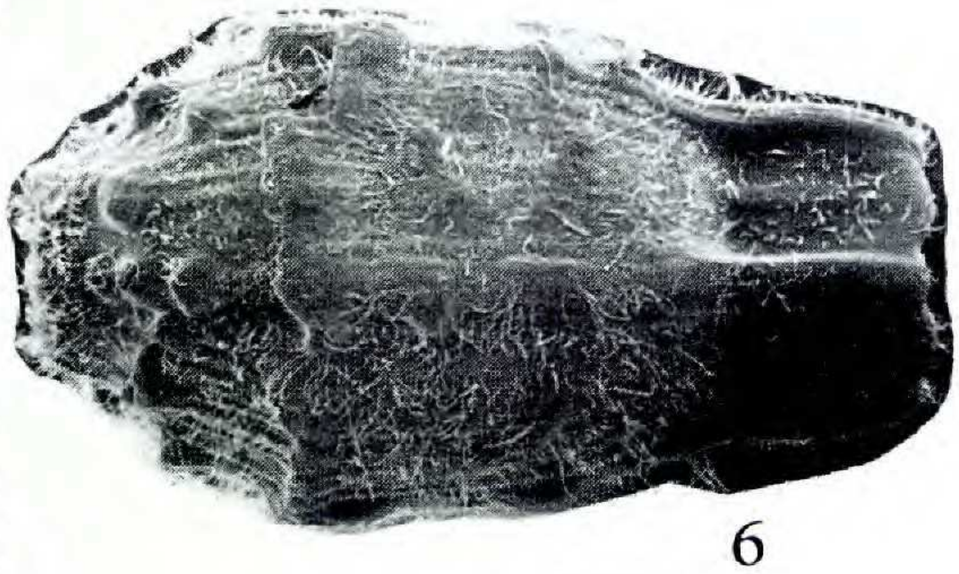
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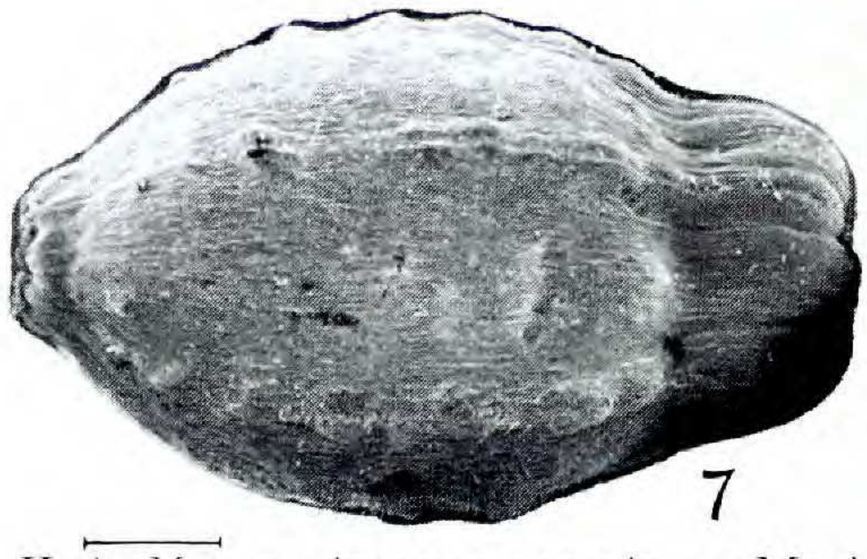
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PLATE II. 1. *M. sanguinea* var. *sanguinea*—Mexico, Chiapas. *Soule 2357* (TEX). 2. *M. sanguinea* var. *breviflora*—Mexico, Jalisco. *Le Duc 254* (TEX). 3. *M. hintoniorum*—Mexico, Michoacán. *Hinton 13909* (TEX). 4. *M. urbanii*—Mexico, Michoacán. *Le Duc 245* (TEX). 5. *M. polonii*—Mexico, Sinaloa. *Le Duc et al 178* (TEX). 6. *M. donahooiana*—Mexico, Michoacán. *Le Duc 247* (TEX). 7. *M. pringlei*—Mexico, Jalisco. *Le Duc 63* (TEX). Bar = 1.0 mm.

3. Anthocarp oblong-ellipsoid, pubescent; perianth orange. ..... 3. *M. hintoniorum*

1. Stamens, if exserted, less than twice as long as perianth.
   4. Perianth > 6 cm long.
      5. Perianth curved downward (especially before anthesis); leaf base truncate; anthocarp obovoid, 6–7 mm long, constricted and truncate at the base and apex. ..... 4. *M. polonii*
      5. Perianth straight, erect (especially before anthesis); leaf base cordate; anthocarp ellipsoid to obovoid, 7–8 mm long, constricted and truncate at base only. ..... 5. *M. longiflora*
   4. Perianth < 6 cm long.
      6. Perianth light pink, < 15 mm long; anthocarp with prominent stiff orange hairs. ..... 6. *M. urbanii*
      6. Perianth red-purple, 15 mm long or longer; anthocarp without stiff orange hairs.
         7. Internodes 13–23 cm long. ..... 7. *M. sanguinea*
         7. Internodes < 13 cm long.
            8. Inflorescence open, few-flowered; anthocarp oblong to oblong-obovate. ..... 8. *M. donahooiana*
            8. Inflorescence compact, many-flowered; anthocarp ovoid to ellipsoid.
               9. Perianth tube at least twice as long as limb-width; flowers white with lavender staminal filaments; anthocarp ellipsoid 9–11 mm long. ..... 9. *M. gracilis*
               9. Perianth tube less than twice as long as limb-width; if flowers white then staminal filaments white; anthocarps ellipsoid to ovoid, 6–9 mm long. ..... 10. *M. jalapa*

1. **Mirabilis pringlei** Weath., Proc. Amer. Acad. Arts 45:424. 1910. (Pl. 3-A). TYPE: MEXICO. GUERRERO: under limestone cliffs, Iguala Canyon, 23 Jul 1907, *Pringle 10384* (HOLOTYPE: GH!; ISOTYPES: F!, LL!, MICH!, RSA!, UC!).

Herbaceous or suffruticose perennials, erect or ascending, 1 m high, much-branched, roots tuberous. Stems slender, finely viscid-pubescent, lower internodes 10–15 cm long, nodes villous. Mid-stem leaves: petiole slender, 3–15 cm long; blade 3.5–13.0 cm long, 2–9 cm wide, thin, bright green, sparsely puberulent; base cordate or deltoid-ovate, cordate to unequally subcordate, apex acute to short acuminate, margin ciliolate (pink on young leaves). Inflorescences open, terminal, composed of many-flowered cymes, these subtended by small, short-petioled leaves. Involucre campanulate, 5–8 mm long, glandular-puberulent, slightly revolute in age, lobes ca. 2 mm long, obtuse or acute, margin ciliolate; ultimate peduncles 1–6 mm long, densely glandular-pubescent. Perianth 2–3 cm long, sparsely glandular-pubescent, white to pink, tubular, slightly swollen above ovary, lobes 9–10 mm long, ca. 5 mm wide, triangular, reflexed after anthesis, apices acute. Stamens exserted, nearly twice as long as the perianth, pink to lavender. Style and stigma white. Anthocarp dark brown to grayish brown, broadly obovoid to oblong, 5–7 mm long, 4–5 mm wide, 5-angled, sparsely

◀ A

B ▶

◀ C

D ▶

PLATE III. A. *Mirabilis pringlei* (*Le Duc 63*, TEX). B. M. *polonii* (*Le Duc 178*, TEX). C. *M. donahooiana* (*Le Duc 248*, TEX). D. *M. gracilis* (*Le Duc 176*, TEX).

warty between ribs, slightly puberulent to glabrate, constricted at both ends, base truncate.

Phenology.—Flowers from late July to September. Flowers open in the evening.

Distribution (Fig. 1).—The Pacific slopes of the Sierra Madre Occidental and western Central Plateau; in full sun to partial shade, crumbly or rocky igneous soil. Altitude 300–2000 m.

Representative specimens: MEXICO. **Guanajuato:** Empalmede, *Rusby 118* (NY). **Guerrero:** Casa Verde, Xochipla, Zumpango de Río, *Rzedowski 16089* (UC). **Jalisco:** El Corcovado, Bridge over Río San Pedro, *Le Duc & Sydor 63* (TEX); Mezquitan, between Autlan & Corcovado, *Le Duc & Sydor 70* (TEX); 25 mi E of El Grullo & W of Ciudad Guzman, *Le Duc 174* (TEX). **Mexico:** Palmar, Temascaltepec, *Hinton 6418* (GH, MICH); Los Cuervos, 8.7 mi NE of Mexico state line along Hwy 130, *Le Duc et al 238* (TEX). **Michoacán:** WSW of Apatzingán, road to Dos Aquas & Aguililla, *Dieterle 4325* (CAS, MICH, MEXU); Tuzantla-Tiquicheo, Zitácuaro, *Hinton 13080* (F, GH, MEXU, MICH, NY, RSA, UC, US); Puerte San Salvador, 54.3 mi N of La Mira junct. HWY 200 & 37, *Le Duc et al. 244* (TEX).

Mirabilis pringlei closely resembles *M. exserta* and *M. hintoniorum* in vegetative characters. It differs markedly from them in perianth structure, having the tube salverform and lobes reflexed. The anthocarps also differ in *M. pringlei* having few contours or warty areas and they are sparsely covered with short hairs.

2. **Mirabilis exserta** Brandegee, Proc. Calif. Acad. Sci. II. 3:165 1891.
TYPE: MEXICO. BAJA CALIFORNIA SUR: "Summits of the spurs of Sierra de San Francisquito," 20 Oct 1890, *T.S. Brandegee 480* (HOLOTYPE: UC!; ISOTYPES: GH!, US!).

Herbaceous or suffruticose perennials, erect, 4–6 dm high, much branched. Stems slender, upper densely viscid puberulent, glabrate below, internodes 7–13 cm long. Mid-stem leaves: petiole slender 1.0–2.5 cm long; blade 6–11 cm long, 4.0–10.5 cm wide, thin, bright green, puberulent when young, soon glabrate, base ovate-orbicular, broadly ovate-deltoid or cordate-ovate, subcordate or truncate, apex acute, acuminate to broadly rounded, margin minutely ciliolate. Inflorescences open, terminal, many-flowered cymes, subtended by small sessile or subsessile orbicular or ovate-lanceolate, often puberulent leaves. Involucre broadly campanulate, 6–11 mm long, densely viscid-villous, lobes broadly triangular, obtuse or occasionally acute, shorter than tube, margin ciliolate; ultimate peduncles 1–5 mm long, densely viscid-villous. Perianth 4–5 cm long, sparsely glandular-villous, white tinged with pink to pale lavender, narrowly funnelform, limb 1.5–2.5 cm broad. Stamens ca. twice as long as perianth; style exceeding stamens in length. Anthocarp dark brown, broadly obovoid or oval, 6–8 mm long, obscurely angled, smooth, tapered at both ends.

Phenology.—Flowering from late September to December.

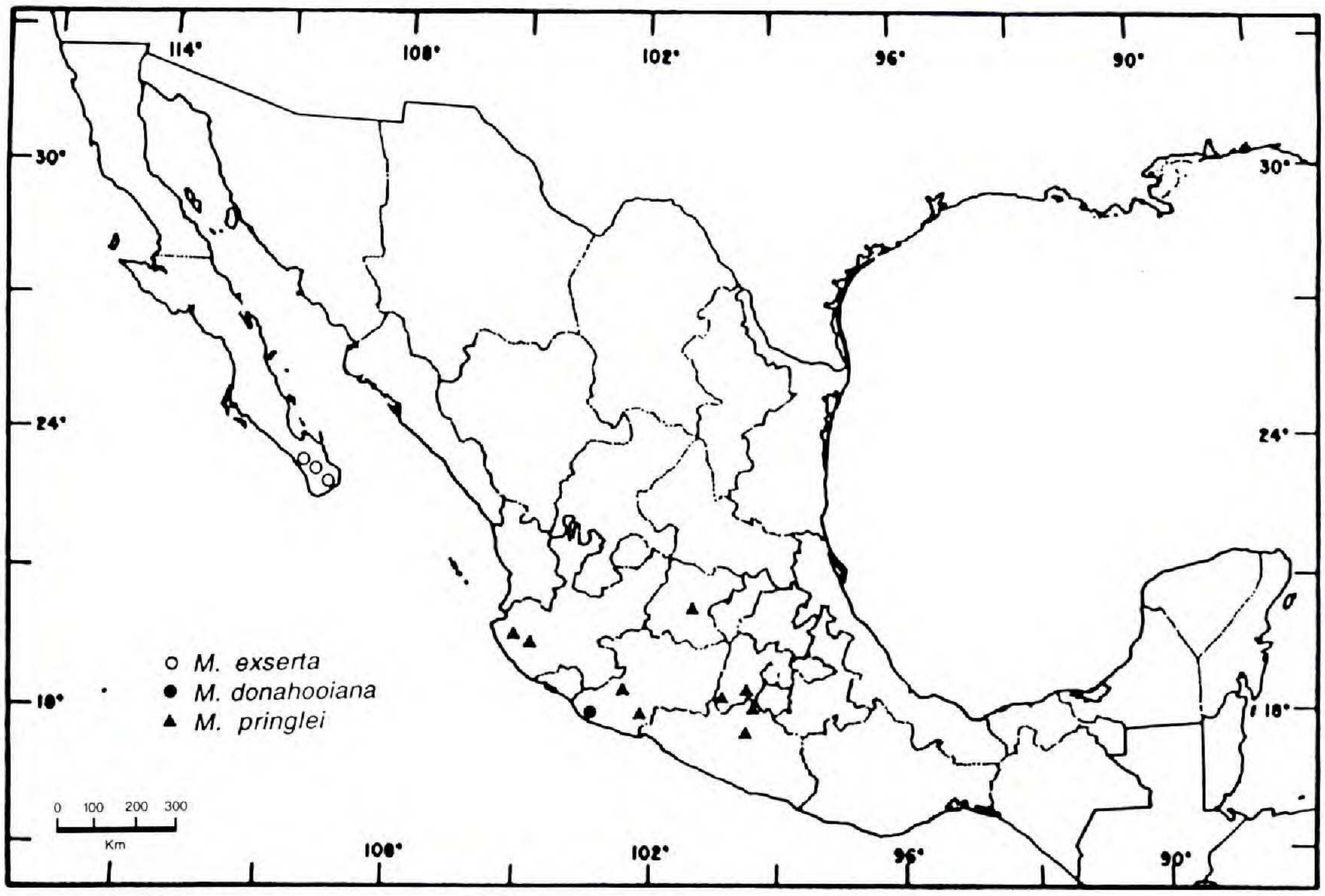

FIG. 1. Distribution of *Mirabilis exserta*, *M. donahooiana* and *M. pringlei*.

Distribution (Fig. 1).—Upper elevations of the mountains of the Cape Region, Baja California. Altitude 1700–2000 m.

Representative specimens: MEXICO. **Baja California Sur:** La. Chuparosa, *Brandegee s.n.* (F, GH); Valley (La Laguna) S of Pico La Aguja on the Sierra La Laguna, *Breedlove 43339* (MEXU); Laguna, Laguna Mts., *Jones 27304* (NY, RSA, UC); Los Limpios, Sierra la Laguna, E of Todos Santos, *Tenorio et al. 10586* (RSA).

This species closely resembles *M. pringlei* in vegetative characters. The flowers resemble those of *M. gracilis* but its stamens are more exserted. The anthocarp is unique within the section *Mirabilis*; it resembles those of section *Quamoclidion* in shape (elliptic) and having a smooth, glabrous surface with only slight indication of furrows.

3. Mirabilis hintoniorum Le Duc, Sida 15:53. 1992. TYPE: MEXICO. MICHOACÁN: District Coalcomán, Villa Victoria, dense woods, 11 Jul 1939, *Hinton 13909* (HOLOTYPE: TEX!; ISOTYPES: G!, MO!, UC!).

Herbaceous or suffruticose perennials(?), erect, 7–8 dm high. Stems slender, striate, nodes puberulent, otherwise glabrous. Mid-stem leaves: petiole slender 1–2 cm long; blade glabrous, 5–9 cm long, 2.0–6.5 cm wide, base broadly to narrowly ovate, asymmetrically cordate or slightly truncate, apex acuminate, margin sparsely ciliolate. Inflorescences terminal, arranged in few-flowered cymes, subtended by sessile or subsessile, ovate to ovate-lanceolate, pubescent leaves. Involucre narrowly campanulate, 2–3

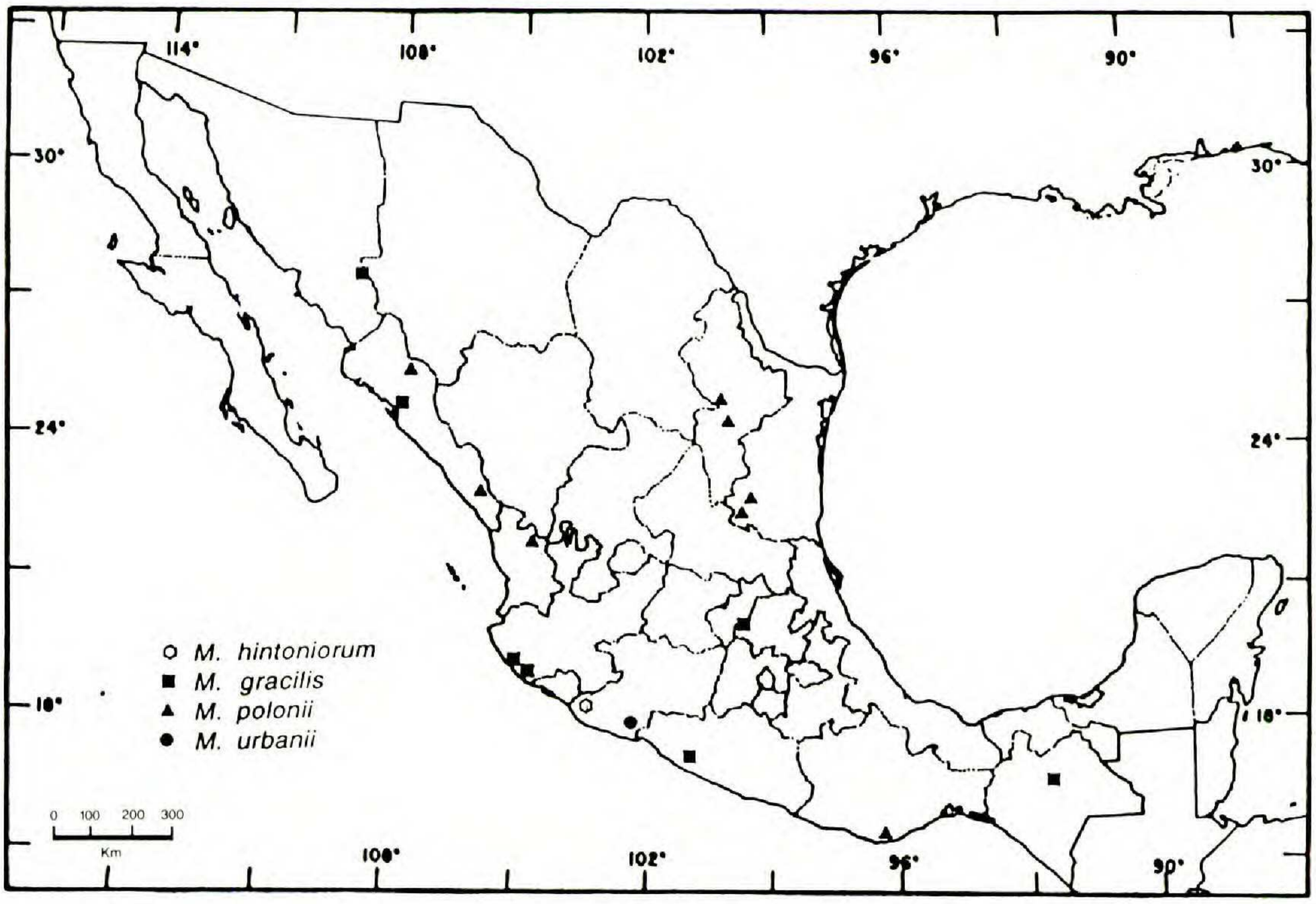

FIG. 2. Distribution of *Mirabilis hintoniorum*, *M. gracilis*, *M. polonii* and *M. urbanii*.

mm long, glabrous or slightly puberulent, lobes narrowly triangular, less than 1/2 the length of tube, margin ciliolate; ultimate peduncles 3–5 mm long, pubescent. Perianth 2.0–2.5 cm long, glabrous or nearly so, orange, tube dilated upwards, limb 5–8 mm broad, lobes obscure, ciliolate. Stamens ca. twice as long as the perianth. Anthocarp dark brown, oblong-ellipsoid, 6–7 mm long, 3 mm wide, 5-angled, the ridges tuberculate, moderately puberulent, constricted at both base and apex.

Phenology.—Flowering in July.

Distribution (Fig. 2).—Known from only type locality, in tropical deciduous forest. Altitude 700 m.

The open terminal inflorescences and ovate leaves with cordate bases of *M. hintoniorum* are most similar to those of *M. exserta* and *M. pringlei*. However, it differs in the extreme reduction of the perianth lobes, the lack of viscid-villous pubescence, and its few-flowered inflorescences. The anthocarp of *M. hintoniorum* most closely resemble those of *M. donahooiana* and *M. polonii* but also shows a resemblance to many anthocarps of *Mirabilis* section *Oxybaphus* differing from the latter in being nonmucilaginous. The flower color of *M. hintoniorum*, as noted by label data, is unusual for the genus, and might be questioned. However, I have collected *M. jalapa* with orange flowers, from a small population in the state of Mexico (*Le Duc 94* TEX), thus giving credibility to Hinton's notation.

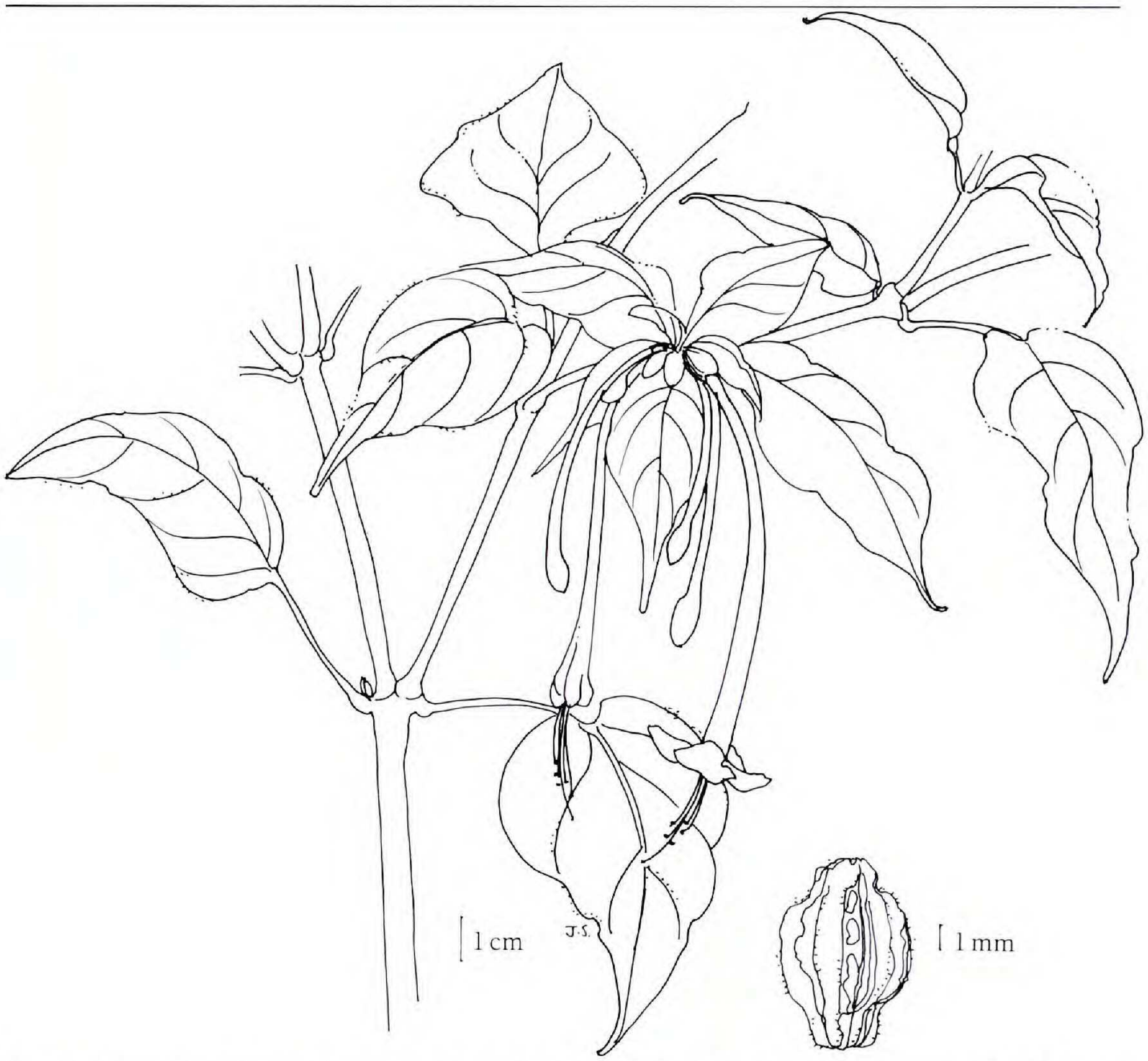

FIG. 3. *Mirabilis polonii* habit and details from holotype showing: upper leaves and flowers with an enlarged detail of the anthocarp.

4. **Mirabilis polonii** Le Duc, sp. nov. (Pl. 3-B; Fig. 3)

Mirabilis gracili (Standl.) Le Duc foliis similis, *M. hintoniorum* Le Duc morphologia anthocarpiorum similis; *M. longiflorae* L. similis perianthiis in longitudine similibus sed differt perianthiis arcuatis (deorsum curvatis), foliorum basibus truncatis, et anthocarpiorum apicibus truncatis.

Herbaceous or suffruticose perennials, erect, 7.5–10 dm high, much-branched, roots tuberous. Stems slender or stout, glabrous or with pubescence restricted to 2 longitudinal lines, internodes 7–9 cm long, nodes puberulence. Mid-stem leaves: petiole slender, 0.5–3.0 cm long; blade 7–11 cm long, 4–5 cm wide, thin, green (often reddish beneath), puberulent, broadly ovate, base asymmetrical, subtruncate or occasionally subcordate, apex attenuate, margin ciliolate. Inflorescences terminal, somewhat open, many-flowered cymes, subtended by small ovate-lanceolate leaves. Involucre slightly pinkish in age, narrowly campanulate, 8–10 mm long, slightly puberulent, lobes 4–5 mm long, lanceolate-oblong, acute, margin ciliolate;

ultimate peduncles 2–5 mm long, puberulent. Perianth 9–11 cm long, glabrate, white, fragrant, tube very elongate, curved downward, ca. 2 mm wide, limb 2.0–2.5 cm broad. Stamens exserted, slightly less than half length of tube, 11–13 cm long, lavender. Style ca. 1 mm longer than stamens. Anthocarp dark brown to brownish black, obovoid, 6–7 mm long, 4–5 mm wide, 5 angled, ridges tuberculate with warty areas between, pubescent, constricted and truncate at both base and apex.

TYPE: MEXICO. SINALOA: along Hwy 40, 3 mi SW of La Guayanera & 2 mi N of the Copolita spur, between Matzatlán and Durango, N 23° 23', W 105° 55', altitude ca. 700 m, 29 Jul 1991, *Le Duc 178* (HOLOTYPE: TEX!; ISOTYPES: MEXU!, others to be distributed).

Representative specimens: MEXICO. **Nayarit:** Mpio Nayar Cerro Cangrejo, Cañada al NE poblado Villa de Guadalupe, *Tenorio & Flores 16206* (RSA). **Nuevo Leon:** Cañón 3.6 mi SW of Los Ajuntas & 7.4 mi NE of La Trinadad, *Le Duc 259* (TEX); Cañón del Pasaje de los Osos, al Pte. de Ybanis, Santiago, *Marroquin 1330* (TEX); Trail between Potrero Redondo & Las Ajuntas, *Mueller 2990* (GH, UC). **Oaxaca:** Río Coyula a 7 km al SE de le Limón, *Refugio-Cedillo 1688* (LL, MEXU). **San Luis Potosi:** Tanjasnec, Mpio San Antonio, *Alcorn 1838* (TEX). **Sinaloa:** Mpio San Ignacio. La Cebolla ± 40 km N de San Ignacio, *Vega, R. y S. Palazuelos 781* (MEXU); 33 mi SW of Rivalcaderos, *Waterfall 12733* (TEX). **Tamaulipas:** 10 km NW of El Progresso, which is ca. 18 km NW of Ocampo, *Standford et al. 1040* (GH, MO, NY, UC).

Phenology.—Flowers from late July to September. Flowers open in the evening.

Distribution (Fig. 2).—Moist Pacific slopes of the Sierra Madre Occidental, Sierra Madre del Sur, and the Eastern protected canyons of the Sierra Madre Oriental; in tropical deciduous forest, semi to full shade, soil crumbly, igneous or limestone. Altitude 900–1500 m.

This species resembles *M. gracilis* in foliage, having thin dark green leaves with truncate bases. The anthocarp, however, is like that of *M. hintoniorum* and *M. donahooiana*. The perianth is at least 6 cm long, resembling that of *M. longiflora*, but the latter is erect while that of *M. polonii* is arching (curved downward).

The species is named in honor of David Polon, an anthropologist who worked in Mexico. Without his encouragement I would not have focused my studies on a genus from Mexico. He was very positive in his beliefs that more research was needed on the plants of Mexico.

5. **Mirabilis longiflora** L., Kongl. Svenska Vetensk. Acad. Handl. 176. t. 6. 1755. *Jalapa longiflora* (L.) Moench, Methodus 508. 1794. *Nyctago longiflora* (L.) Salisbury, Prodr. Stripium Chap. Allerton 57. 1796. TYPE: MEXICO. without specific locality or date. Illustration t. 6 adequately typifies this name. There is one specimen 240.3 LINN in the Linnean collection. No information is indicated on the sheet as to the origin of the material or if Linnaeus studied it. The only other element cited by Linnaeus is the illustration in Rerum Medicarum Novae Histpaniae Thesaurus f. 2, p. 170 by Francisco Hernández, 1651.

Herbaceous or suffruticose perennials, erect, 0.5–1.5 m high, much

branched, roots tuberous. Stems slender or stout, densely viscid-puberulent or short villous, lower internodes usually longer than leaves. Mid-stem leaves: petiole slender, 2–6 cm long; blade 6–12 cm long, 3–7 cm wide, thin, bright green, densely viscid-puberulent to sparsely so, cordate-ovate to narrowly deltoid-ovate or lance-ovate, base cordate, apex acute to attenuate, margin ciliolate. Inflorescences dense, axillary or terminal, many-flowered cymes, subtended by sessile or subsessile reduced leaves. Involucre campanulate, 1.0–1.5 cm long, densely glandular-pubescent, lobes about as long as tube, triangular to narrowly triangular-lanceolate, very acute to long-attenuate, usually exceeding anthocarp in fruit, margins ciliolate; ultimate peduncles ca. 3 mm long or less, densely glandular-pubescent. Perianth 7–17 cm long, densely viscid-villous outside, white, throat tinged with pink or purplish-red, fragrant, salverform, tube very slender, ca. 2 mm in diameter, limb 2–3 cm broad, lobes broad shallow-rounded. Stamens exserted, ca. 2.5 cm beyond throat, purplish-lavender. Anthocarp dark brown, puberulent, constricted and truncate at base. Chromosome number n = 29 (Showalter 1935; Kruszewska 1961).

Inflorescence congested, glomerate, subtending leaves sessile; anthocarp obscurely 5-angled, slightly puberulent, prominent white-warty areas, the apex truncate. ..... 5a. *M. longiflora* var. *longiflora*

Inflorescence open, subtending leaves short-petiolate to subsessile; anthocarp 5-angled, puberulent, warty, the apex acute. ..... 5b. *M. longiflora* var. *wrightiana*

5a. Mirabilis longiflora L. var. longiflora

Phenology.—Flowering from July to September. Flowers open in the evening.

Distribution (Fig. 4).—Mostly the Trans-Mexican Volcanic Belt and Central Valleys of Mexico, growing under *Juniperus*, Magey or other similar plants, at the margins of cultivated fields. Altitude 1800–2800 m.

Representative specimens: MEXICO. **Guanajuato:** Xichú road, *Kenoyer 2298* (GH). HIDALGO: 6 km N of Pachuca, *Hernández 4346* (GH); Cerro Jazmin, 2 km NE of Apan, *West D-10* (UC). **Nuevo Leon:** Monterrey, *Orcutt 1228* (US). **Oaxaca:** Escuela Normal, Oaxaca, *Conzatti 973* (GH). **Puebla:** Santa Ana, *Nicolas 5317* (NY); ca. 2 km N of Saltillo La Fragua, Hwy 140 from Jalapa to Puebla, *Poole 1555* (TEX); San Luis Tultitlanapa, *Purpus 3374* (F, GH, MO, NY, UC, US); Mt. Orizaba, Esperanza, *Seaton 493* (F, GH). TLAXCALA: 1 km WSW Tlaxco on road to Apan, Hwy 119, *Le Duc 170* (TEX); E of Cuapiaxtla on Hwy 136, *Le Duc et al. 224* (TEX). **Veracruz:** Perote, *Balls B5518* (UC, US); Tenextepec, Mpio Perote, *Chazaro & Acosta 3739* (MICH); Cerros arriba de Santiago, *Nevling & Gomez-Pompa 1888* (CAS, GH, MEXU, RSA); near town of Alchichica, *Ramos 284* (GH, MEXU); near Rancho El Camino Totalco & La Gloria, *Ramos 226* (GH); ca. 20 air km SSW of Perote, *Turner 15209* (TEX); 3 km S of Totalco, *Vazquez 4843* (MO).

5b. Mirabilis longiflora var. wrightiana (A. Gray) Kearney & Peebles, J. Wash. Acad. Sci. 29:475. 1939. *Mirabilis wrightiana* A. Gray ex. Britton &

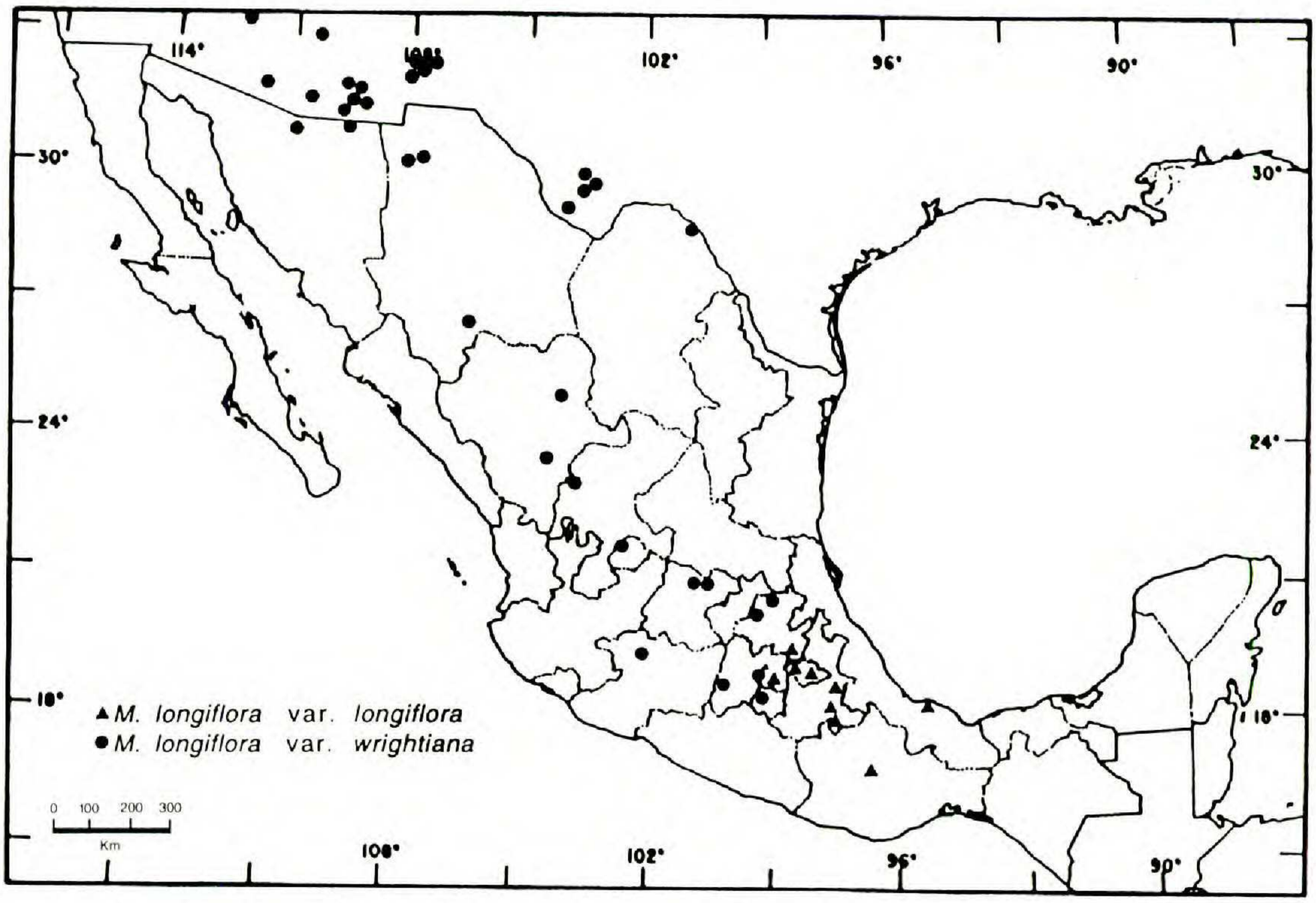

FIG. 4. Distribution of *Mirabilis longiflora* var. *longiflora* and *M. longiflora* var. *wrightiana* in Mexico and U.S.A.

Kearney, in Trans. New York Acad. Sci. 14:28. 1895. TYPE: U.S.A. NEW MEXICO. Grant Co.: Santa Rita de Cobre, valley of the Coppermines creek, 4 Aug 1851, *C. Wright 150* (HOLOTYPE: GH!; ISOTYPE: NY!). A number of specimens were distributed by A. Gray under the exsiccata number 1702. It has not been ascertained if these are all isotypes.

Mirabilis suaveolens H.B.K., Nov. Gen. Sp. 2:213.1817. TYPE: MEXICO. GUANAJUATO: vicinity of Guanajuato, Aug–Sep. 1803, *Humboldt & Bonpland s.n.* (HOLOTYPE: P).

Mirabilis tubiflora Fries ex. Heimerl, Beitr. Syst. Nyctag. 20. 1897. *Mirabilis wrightiana* var. *tubiflora* (Heimerl) Heimerl, Notizbl. Bot. Gart. Berlin-Dahlem 11:450. 1932. TYPE: Cultivated plant, Leipzig Botanical Garden grown from seed provided by Th. M. Fries. (HOLOTYPE: W, destroyed; ISOTYPE: F!). Material was destroyed in 1945, during the war, pers. comm., Harald Riedl, Director W.

Differs from *M. longiflora* var. *longiflora* in stems more slender, upper most leaves short-petiolate. Inflorescences open, involucre slightly viscid-puberulent. Stamens slightly more exserted, ca. 3 cm. Anthocarp dark brown, oblong to ellipsoid, ca. 8 mm long, ca. 5 mm wide, 5-angled, puberulent, except on swollen areas, warty, base constricted and truncate, apex acute.

Phenology.—Flowers from July to September. Flowers opening in the evening.

Distribution (Fig. 4).—Central Mexico northwards to the mountain ranges

of SE Arizona, SW New Mexico, and Big Bend area of Texas, U.S.A.; usually in the shade of trees and shrubs, occasionally in open grasslands, in rocky soil. Altitude 1500–3700 m.

Representative specimens: MEXICO. **Aquascalientes:** 6 km E of Tepezalá, *Rzedowski & McVaugh 1208* (MICH). **Chihuahua:** Soldier Canyon, Sierra Madre Mts., *Jones s.n.*(RSA); NW end of Sierra del Diablo, *Stewart 960* (GH); 24 km NW of Balleza, *Tenorio,et al. 9917* (RSA, TEX); Santa Eulalia, Rosalia, *Wilkerson s.n.* (UC); Gallejo Springs, *Wislizenus 122* (MO). **Coahuila:** Cañón above Palomas, Saltillo, *Gregg 331* (GH); Mpio Villa Acuña, Hacienda Piedra, Canyon of Sentenela, *Wynd & Mueller 585* (MO, NY). **Distrito Federal:** Sierra de Guadelupe, cerro Grande 5 km al NNW of Cuautepec, *Moreno 275* (MICH); Teutli, *Ventura 1876* (NY, MEXU, RSA). **Durango:** Hwy 30 between La Zarca & La Cadera, 22 km E of Hwy 45, *Cruden 2035A* (UC); Hwy 40 at the crossing of arroyo de Los Mimbres, 5 mi W of Guadalupe Victoria, *Le Duc 180* (TEX). **Guanajuato:** Guanajuato, *Dugis s.n.*(GH); 30 mi E of San Luis de la Paz toward Xichú, *Straw & Forman 1466* (MICH). **Hidalgo:** Puerto de la Zorra NE of Jacala, *Moore 3524* (GH, UC); upper slopes of El Monte on trail from Zimapan to mines of El Monte, *Moore, Jr. 4474* (MEXU, MICH). **Jalisco:** Mpio de Zapopan, Río Caliente La Primavera, *Diaz-Luna 333* (MICH); Mpio Tlajomulco, San Lucas Evangelista, *Machuca-Nuñez 2736* (MICH). **Mexico:** Dist. Temascaltepec, Pañon, *Hinton 4412* (GH, MICH, MO, US); Dist. Temascaltepec, Salitree, *Hinton 4313* (GH, MICH, NY, RSA, US); Lomas, *Lyonnet 1560* (CAS, MEXU, UC); E of Tenango del Aire, Río Tenango, *Pineda 519* (CAS, MICH, UC); Mpio Tepatzotlán, Presa de la Concepcion, *Rzedowski 22891* (CAS, MICH, TEX). **Michoacán:** Paricutin, *Eggler 124* (MO). MORELOS: Huajojutla, *Alexander & Hernández 2017* (CAS, GH, MICH, NY, UC, US); Tepoztlan near Cuernavaca, *Le Duc, et al. 234* (TEX); Barranca near Cuernavaca, *Pringle 6377* (CAS, GH, MO, NY, UC). **Nuevo Leon:** entrance de Garcia Cave, Grutas, 32 mi NW of Monterrey, *Ward 5666* (MICH). **San Luis Potosi:** 7 km SW of Pozuelos and 22 km SW of San Luis Potosi on the hwy to Guadalajara, *Johnston et al. 12267* (CAS). **Sonora:** Imuris, *Abrams 12771* (RSA); Fronteras, *Hartman 976* (MO). **Zacatecas:** 95 mi W of Sombrerete, *Taylor 6247* (NY); 3 mi W of Villanueva, *Walker 76H48* (MO, NY).

U.S.A. **ARIZONA: Cochise Co.:** Dragoon Mts., Sorin Camp, *Daniel 3079* (MICH, NY); Huachuca Mts. Carr Canyon, *Gould et al. 2428* (UC); 1.5 mi W of Turkey Creek Ranger Station, *Holler et al. 1024* (NY); Portal, *Spellenberg et al. 2671* (NY). **Gila Co.:** Workman Creek, Sierra Ancha, *Wagner 327* (UC). **Pima Co.:** Fresnel Canyon, Baboquivari Mts., *Gilman 49* (GH, MO, NY). **Santa Cruz Co.:** Atascosa Mts. near Yanks Canyon, *Franklin 5390* (NY). **NEW MEXICO: Grant Co.:** Forest Nursery, Fort Bayard water shed, *Blumer 231* (GH, NY); Santa Rita, on dirt road called Miner's Legend, *Le Duc 185* (TEX); community of Fierro, *Le Duc 190* (TEX). **Socorro Co.:** San Mateo Springs, 10 mi W of Hwy 85, Socorro/ Sierra Co. line, *Baad 1349* (MICH); Mogollon Mts. mid fork of the Gila river, *Metcalfe 432* (GH, UC). **TEXAS: Brewster Co:** Alpine, *Stieger 240* (NY). **Jeff Davis Co.:** Limpia Creek W of Fort Davis, *Correll 33672* (GH, UC); summit of Sawtooth in Davis Mts., *Correll 34971* (NY); Limpia Canyon, Hwy 118 near Ft. Davis, *Le Duc 195* (TEX); Davis Mts., Sawtooth, *Palmer 31895* (MO); old Kent road W of Mt. Locke, *Steiger 1123* (NY); Fern Canyon, *Steiger 1256* (NY); Fern Canyon, *Warnock T634* (NY); 2 mi N of Fort Davis, *Warnock 8034* (MICH). **Presidio Co.:** Cibolo Creek, 5 mi E of Russ. Menzies ranch headquarters, *Warnock 3671* (NY); Cibolo Creek, Cieniguita, 10 mi N of Shafter, *Warnock & Hinckley 4500* (UC).

Mirabilis longiflora was cultivated by the Aztecs as an ornamental plant and, perhaps, as a medicinal herb much as it is today in parts of Mexico

(Alcorn 1984). Many of the populations in the Central Plateau valleys of Mexico show evidence of hybridization between *M. longiflora* and *M. jalapa*. Putative hybrids have also been recorded in the literature of Europe (Lepeletier 1806). The plant described by Linnaeus was probably from a European garden and its description is consistent with the numerous *M. longiflora* populations I have observed cultivated or commensal from the Central Mexican Plateau valleys to Oaxaca. Several characters seem to be shared by these various populations. The terminal glomerate many-flowered cymes characteristic of *M. jalapa* are also characteristic of *M. longiflora* var. *longiflora*. In many populations, plants with flowers resembling those of *M. jalapa* have vegetative characters resembling *M. longiflora*. *Mirabilis longiflora* var. *wrightiana* of the mountain areas of southern Arizona, New Mexico and Texas, and the northern desert regions of Mexico, differs from *M. longiflora* var. *longiflora* in inflorescence and anthocarp characters, appears to be the wild progenitor. It is possible that *M. longiflora* was not originally native to the Central plateau valleys of Mexico but was introduced from the more northern mountains in pre-Columbian times.

6. **Mirabilis urbanii** Heimerl, Oesterr. Bot. Z. 56:250. 1906. TYPE: MEXICO. MICHOACÁN: S of San Salvador, 11–12 Jul 1898, *Langlassé 240* (HOLOTYPE: W, destroyed; ISOTYPES: G! K!, P!). The holotype was destroyed during the war in 1945, pers. comm., Harald Riedl, Director W.

Herbaceous perennials, ascending or semidecumbent, 10–30 cm high, much branched, roots swollen or tuberous. Stems slender, young puberulent, mature glabrous or with pubescence restricted to 2 longitudinal lines, internodes 5–7 cm long. Mid-stem leaves: petiole slender, 1.0–1.5 cm long; blade 3.5–4.5 cm long, 2.5–3.0 cm wide, thin, bright green, puberulent, ovate-deltoid, base asymmetrical, grading into the petiole, apex attenuate or acute, veins few, weak or little branched. Inflorescences solitary in the leaf axils, or terminal and aggregate in small 2–3 (–4) flowered cymes, subtended by few small subsessile ovate-lanceolate leaves. Involucre narrowly campanulate, ca. 7 mm long, glabrate, the lobes ca. the same length as tube, lanceolate-oblong, subobtuse, the margin ciliolate; the ultimate peduncles 3–4 mm long, short-villous. Perianth 1.5–2.5 cm long, short-villous below, purplish-red to lavender-pink, tube funnelform, the limb 12–14 mm broad. Stamens slightly exserted, pink. Flowers may be cleistogamous late in season. Anthocarp brown to dark brown, oblong-ellipsoid, 6–7 mm long, 5-angled, ridges slightly tuberculate; distinct pubescence of orange-brown scalarified trichomes containing cystoliths; constricted at both base and apex.

Phenology.—Flowers from late July to September or October. Flowers open in the morning.

Distribution (Fig. 2).—Pacific slopes of the Sierra Madre del Sur in Michoacán; crumbly igneous soil. Altitude 600–900 m.

Representative specimens: MEXICO. **Michoacán:** 4.9 mi S of Puerte San Salvador, along Hwy 37, *Le Duc et al. 245* (TEX); 20 km N of Infiernillo, *Nuñez 1687* (CAS).

Mirabilis urbanii possesses several distinctive characters. Its leaves which are truncate with the blade base grading into the petiole, and the anthocarp with its distinctive bristle-like, scalarified trichomes. Because of this, the position of *M. urbanii* in section Mirabilis is somewhat questionable. It is similar to *M. sanguinea*, differing from the latter in the above mentioned leaf and anthocarp characters.

7. **Mirabilis sanguinea** Heimerl, Notizbl. Bot. Gart. Berlin-Dahlem 11:451 1932. TYPE: MEXICO. GUERRERO: Campo Morado, 14 Jun 1899, *Langlassé 1058* (HOLOTYPE: W, destroyed; ISOTYPE: F!, GH!). The holotype was destroyed during the war in 1945, pers. comm., Harald Riedl, Director W. Isotype at GH has the collection no. 1058 written in, I could not discern if this was actually Langasse's number but make the assumption that it is.

Herbaceous perennials, erect or semidecumbent, 30–40 cm high, multistemmed, roots tuberous. Stems slender, glabrous to very puberulent, internodes strongly elongate, 13–23 cm long, the nodes with lateral puberulence. Mid-stem leaves: petiole slender, usually half as long as or longer than blade; blade 60–70 mm long, 35–55 mm wide, thin, green, glabrous, rhombic-orbicular, cordate-deltoid, base cordate to subequal truncate, apex acute, margin minutely ciliolate. Inflorescences dense, terminal many-flowered cymes, subtended by small ovate-lanceolate to lanceolate leaves. Involucre narrowly campanulate, ca. 4 mm long, 2–5 mm wide, lobes slightly acute, margin ciliolate, exceeding anthocarp in fruit; ultimate peduncles 1.5–3.0 mm long, somewhat puberulent to densely puberulent. Perianth 15–35 mm long, glabrous or upper half long villous, blood red to lavender-pink, funnelform to salverform, tube narrow, ca. 0.5 mm, limb gently expanding to 13 mm broad, lobe apices obtuse. Stamens exserted, 17–37 mm long, lavender. Anthocarp brown to brownish-black, obovate-elliptic, 3.5–4.5 mm long, 2.0–2.5 mm wide, 5-angled, ridges tuberculate, hirsute, constricted near base, with nipple-shaped apex.

Perianth 20–35 mm long; flowers red ..... 7a. *M. sanguinea* var. *sanguinea*
Perianth 15–20 mm long; flowers cerise to lavender-red ... 7b. *M. sanguinea* var. *breviflora*

7a. **Mirabilis sanguinea** Heimerl var. **sanguinea**

Phenology.—Flowers from July to September.

Distribution (Fig. 5).—Western slopes of the Sierra Madre del Sur, inland to mountains along the Guerrero-Mexico and Morelos state lines and south to Chiapas. Altitude 800–2500 m.

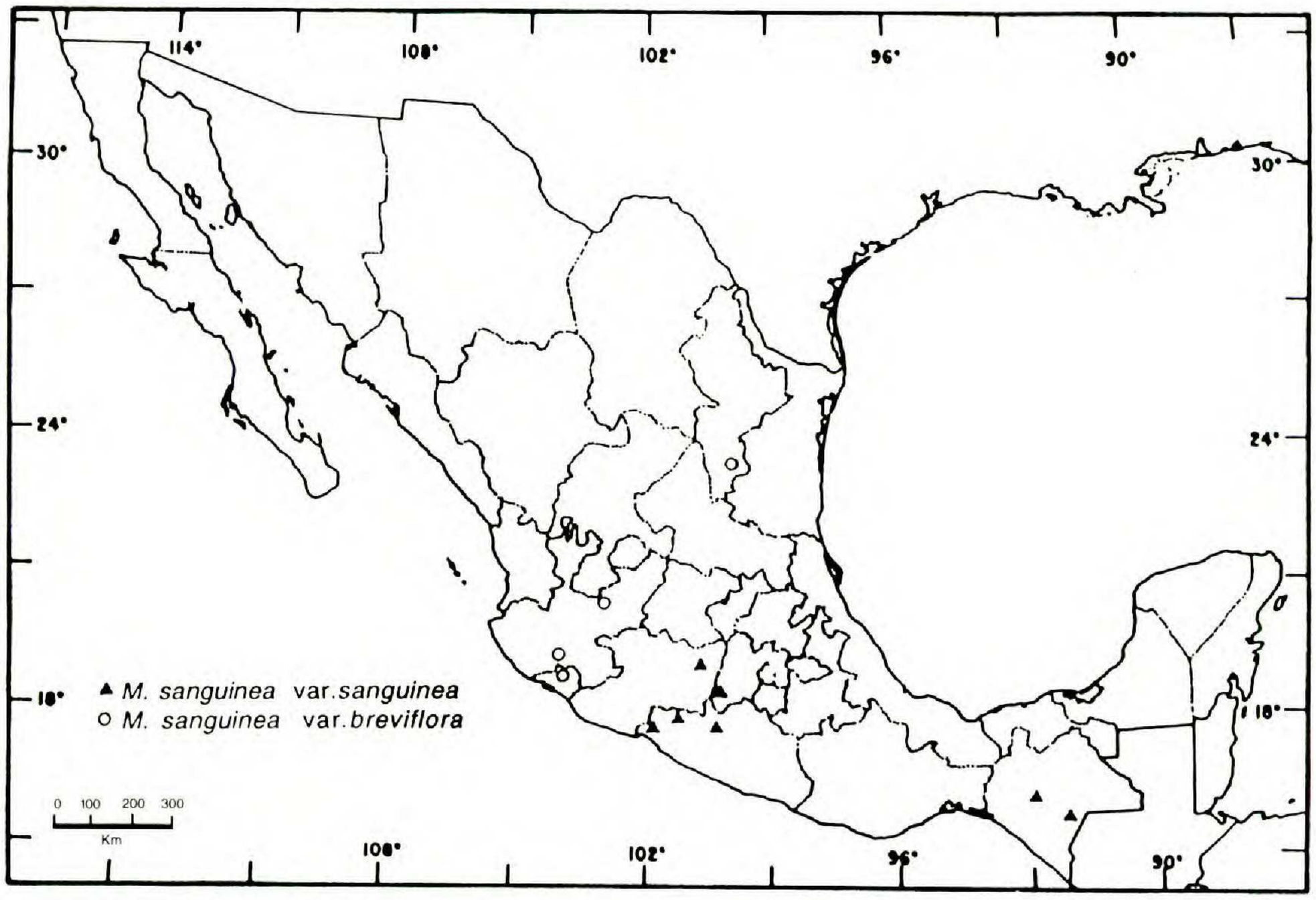

FIG. 5. Distribution of *Mirabilis sanguinea* var. *sanguinea* and *M. sanguinea* var. *breviflora*.

Representative specimens: MEXICO. **Chiapas:** Suchiapa, road to Villa Flores, *Breedlove 28076* (NY); El Chorreadero, 5.6 mi E of Chiapa de Corozo, *Breedlove 10679* (F, LL, MICH); Río Grijalva Canyon, Hwy 211 N of Amatenango de la Frontera, *Soule 2359* (TEX). **Guerrero:** Aquazarca, Mina, *Hinton 10452* (F, GH, MICH, MO, NY, RSA, TEX, UC); Campo Marado, Mina, *Hinton 14320* (F, GH, MICH, NY, RSA, UC, US). **Michoacán:** La Florida, Zitacuaro, *Hinton 11976* (F, GH, MICH, MO, NY, RSA, TEX, UC, US). **Mexico:** Nanchititla, Temascaltepec, *Hinton 4521* (MICH, UC, US).

7b. **Mirabilis sanguinea** var. **breviflora** Le Duc, var. nov. (Fig. 6)

Varietati typicae similis sed floribus perianthio breviore et limbo latiore differt.

Phenology.—Flowers from July to September.

Distribution (Fig. 5).—Western slopes of the Sierra Madre del Sur, inland to mountains along the Guerrero-Mexico and Morelos state lines north through the Sierra Madre Oriental and Sierra Madre Occidental. Altitude 800–2500 m.

TYPE: MEXICO. JALISCO: Ejido Santa Catarina Balneario, 0.9 mi N of Hwy 104 & 401 jct, 26 Jul 1991, *Le Duc et al. 251* (HOLOTYPE TEX!; ISOTYPES: MEXU!, others to be distributed).

Representative specimens: MEXICO. **Jalisco:** Road to Tapalpa, 10.6 mi from jct. of old Hwy 54, 0.8 mi from before microwave tower, *Le Duc et al. 254* (TEX). **Nuevo Leon:** 13 km al e de San Antonio Pena Nevada, Mpio Zaragoza, *Hernández S. et al. 2716* (TEX).

The entities from Jalisco and Nuevo Leon differ from *M. sanguinea* var.

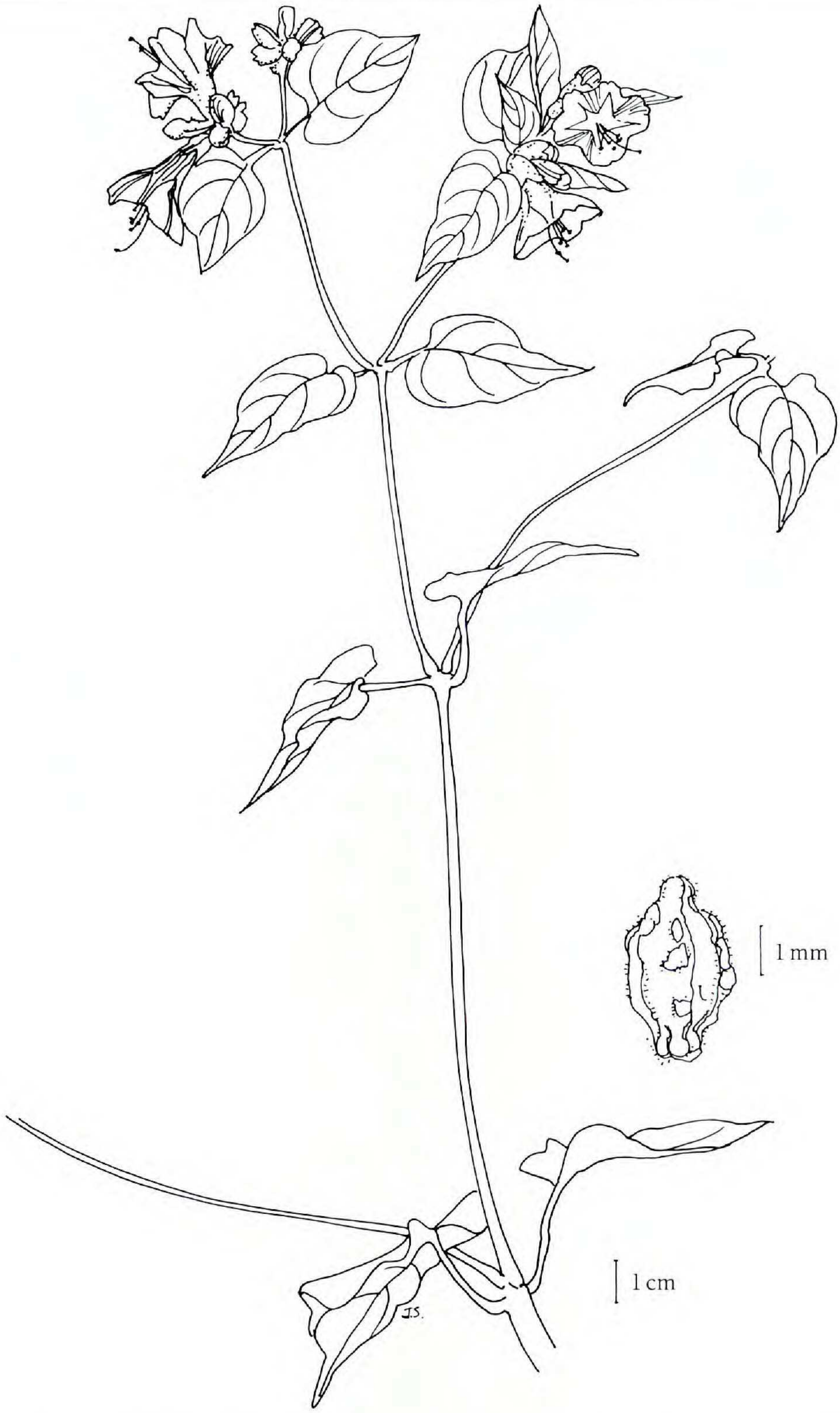

FIG. 6. *Mirabilis sanguinea* var. *breviflora* habit and details from holotype showing: upper leaves and flowers with an enlarged detail of the anthocarp.

sanguinea. They have a shorter perianth tube,15–17 mm long, which flairs more and is lavender-purple in color. The Jalisco plants, which I have observed, all bloom in the morning.

Mirabilis sanguinea is similar to speices of the section *Oxybaphus* in perianth, and in the shape and pubescence character of the anthocarp. This species differs from section *Oxybaphus* in having 1-flowered involucres that are not enlarged in fruit, and nonmucilaginous anthocarps. Within the section *Mirabilis*, *M. sanguinea* appears to be most similar to *M. urbanii*.

8. **Mirabilis donahooiana** Le Duc, sp. nov. (Pl. 3-C; Fig. 7)

Mirabili hintoniorum Le Duc ac *M. polonii* Le Duc morphologia anthocarpiorum similis; *M. jalapae* L. proprietatibus foliorum ac florum similis. Differt a *M. jalapa* morphologia anthocarpiorum, floribus matutino aperientibus, et corollarum limbo magis profunde lobo.

Herbaceous or suffruticose perennials, erect, 75–120 dm high, much branched, roots tuberous. Stems slender or stout, younger with pubescence restricted to 2 longitudinal lines, mature glabrous, internodes 7–11 cm long, nodes with lateral puberulence. Mid-stem leaves: petiole slender, 0.5–2.5 cm long; blade 2–8 cm long, 1.0–4.5 cm wide, thin, green, slightly puberulent, broadly ovate, base asymmetrical, subtruncate, apex attenuate, margin ciliolate. Inflorescences open, terminal, many-flowered, cymes, subtended by small ovate-lanceolate leaves. Involucre narrowly campanulate, 10–12 mm long, lobes 5–6 mm long, puberulent. Perianth 3.0–3.5 cm long, ca. 2 mm wide, limb 1.5–2.5 cm broad, pubescent, lavender-pink. Stamens only slightly longer than tube, lavender-pink. Style slightly longer than stamens. Anthocarp brown, oblong-obovate, 5–6 mm long, ca. 3 mm wide, puberulent, ridges tuberculate, slightly warty between ridges; constricted and truncate at both base and apex.

Phenology.—Flowering from July to September. Flowers open in the morning.

Distribution (Fig. 1).—Area around Aquila, Michoacán, Mexico, in tropical deciduous forest, in partial shade at the foot of rocky cliffs or road cuts, in crumbly igneous soil. Altitude ca. 25 m.

TYPE: MEXICO. MICHOACÁN: road to Aquila, 4.8 mi NW from jct of Hwy 200, 3.5 mi before La Joya bridge, N 18° 37' 30" W 103° 30', 8 Aug 1992, *Le Duc et al. 248* (HOLOTYPE: TEX!; ISOTYPES: MEXU!, others to be distributed).

Representative specimens: MEXICO. **Michoacán:** Aquila, Dist. of Coalcomán, *G. Hinton 16017* (LL, MICH, NY, RSA, UC); side road to Aquila, 8.3 mi NW from jct of Hwy 200, just before La Joya bridge, *Le Duc et al. 247* (TEX).

Anthocarps of this species are similar to those of *M. hintoniorum* and *M. polonii*, in other respects the species resembles *M. jalapa*. *Mirabilis donahooiana* differs from the latter in having a narrower perianth with deeply

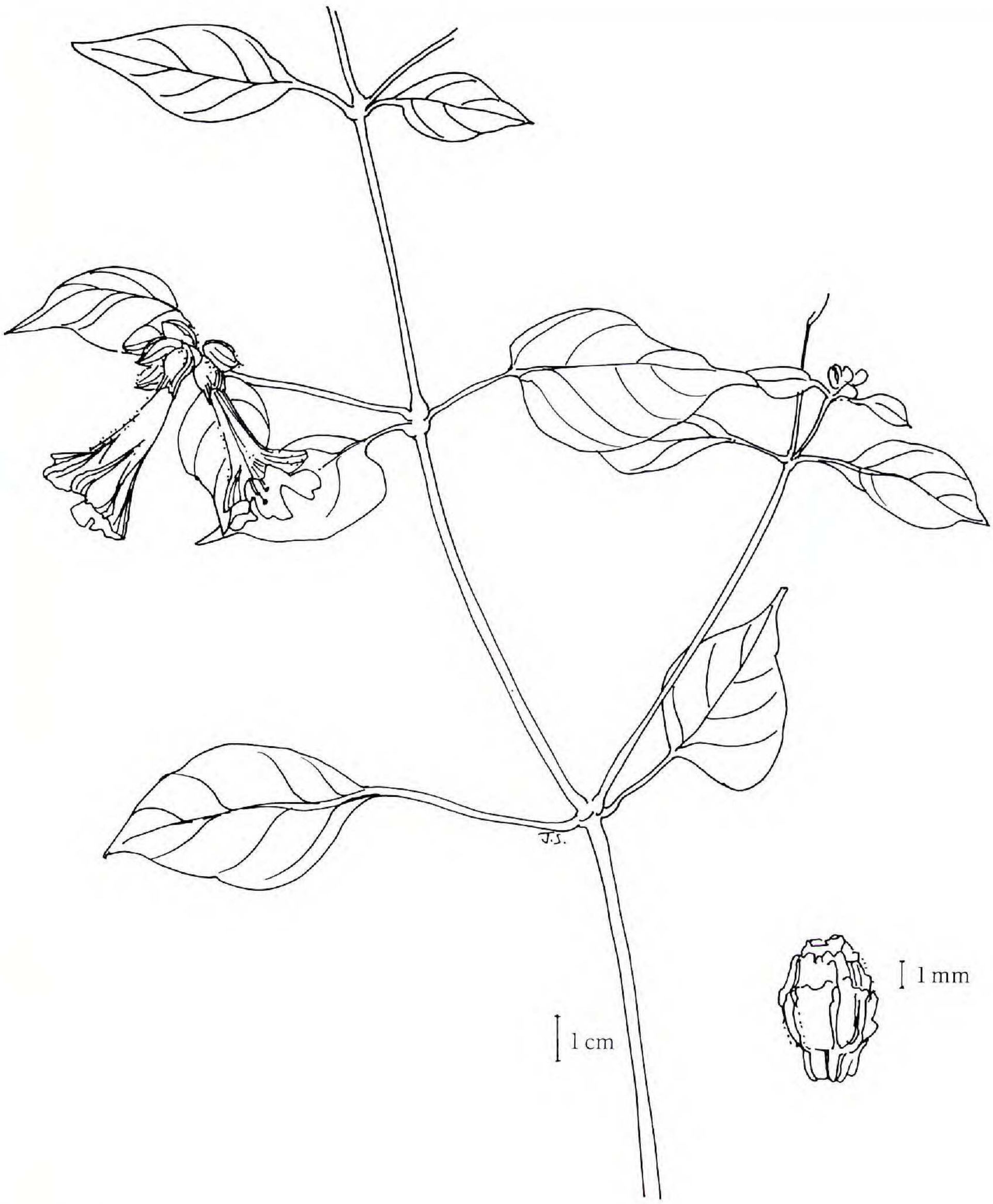

FIG. 7. *Mirabilis donahooiana* habit and details from holotype showing: upper leaves and flowers with an enlarged detail of the anthocarp.

lobed limb. It blooms in the morning, and is closed before four o'clock in the afternoon, the time when *M. jalapa* begins to bloom.

This species is named in memory of Absalom Donahoo, the author's great grandfather. Mr. Donahoo was a pioneer plantsman in Nebraska in the 1860s and 70s. It was his legacy of plant knowledge that led the author to her career in plant systematics.

9. **Mirabilis gracilis** (Standl.) Le Duc, comb. & stat. nov. (Pl. 3-D; Fig. 8).
Mirabilis jalapa var. *gracilis* Standl., Contr. U.S. Natl. Herb. 12:367. 1909 TYPE: MEXICO. SINALOA: vicinity of Culiacan, 17 Sep 1904, *T.S. Brandegee s.n.* (HOLOTYPE: UC!).

Herbaceous or suffruticose perennials, erect, 75–100 dm high, much branched, roots tuberous. Stems slender or stout, glabrous or with pubescence restricted to 2 longitudinal lines, lower internodes 10–12 cm long, (occasionally 28–30 cm), the nodes ± villous. Mid-stem leaves: petiole slender, 1.5–3.0 cm long; blade 6–9 cm long, 3.0–4.5 cm wide, thin, dark green, glabrous, deltoid-ovate, ovate, base asymmetrical, truncate, apex acuminate, margin minutely ciliolate. Inflorescences terminal few-flowered cymes, subtended by short-petioled, small leaves. Involucre campanulate, 8–10 mm long, glabrous, lobes 4–5 mm long, triangular, apices acute, margin ciliolate; ultimate peduncles ca. 3 mm long, villous. Perianth 6.0–6.5 cm long, glabrous, fragrant, white, salverform, tube ca. 3 mm in diameter, limb ca. 2.5 cm broad. Stamens exserted, 8–9 cm long, lavender. Anthocarp dark brown, broadly obovoid to oval, 9–10 mm long, 4–5 mm wide, 5 angled, warty, pubescent, base constricted and truncate, apex acute.

Phenology.—Flowering from late July to October. Flowers open in the evening.

Distribution (Fig. 2).—Mostly Pacific slopes of the Sierra Madre Occidental and Sierra del Sur; Chihuahua to Michoacán, Mexico, occasionally in mts. of the Central Plateau; in tropical short tree or deciduous forest, partial to full shade, most often at the foot of a cliff. Altitude 100–2000 m.

Representative specimens: MEXICO. **Chiapas:** along Hwy 190 in Zinacantán paaje of Multajoc, Mpio Ixtapa, *Breedlove 13995* (F). **Chihuahua:** Guasaremos, Río Mayo, *Gentry 1549* (CAS, F, GH, MO, UC). **Guerrero:** Campo Morado, Otatlan, *Hinton 14489* (LL, MICH, NY, UC). **Jalisco:** 4.5 mi N of El Rincon, Hwy 80, *Le Duc & Sydor 71* (TEX); Chamela, Estación de Biologia Chamela, UNAM. *Magallanes 3822* (F, MEXU). **Mexico:** 5 mi SW of Santo Tomás de los Plátanos (19.09N, 100.2W), *G. Webster 21189* (MEXU). **Michoacán:** Huizontla, Dist. Coalcomán, *Hinton 15970* (LL, MICH, NY, RSA, UC). **Oaxaca:** Presa Temazcal, Vertederos de le presa, Distr. Tuxtepec, *Cortés, L y R. Torres 49* (MEXU). **Queretaro:** Mpio of Landa de Matamoros, Tangajo, ca. 15 km W of Santa Ines, *Fernández 3153* (NY).

This species closely resembles *M. jalapa*, but differs in the few-flowered inflorescences, the perianth slightly longer, the stamens well exserted, and lavender rather than the same color as the perianth. The large anthocarp with its unique sulptured topography is unlike any other within the section *Mirabilis*.

10. **Mirabilis jalapa** L., Sp. Pl. 177. 1753. *Jalapa congesta* Moench, Methodus 508. 1794. *Nyctago versicolor* Salisbury, Prodr. Stirp. Chap. Allerton 57. 1796. *Nyctago jalapae* De Candolle, Fl. Franç. 426. 1805. TYPE: locality and collector unknown, probably from cultivated material obtained originally in Mexico or the West Indies.

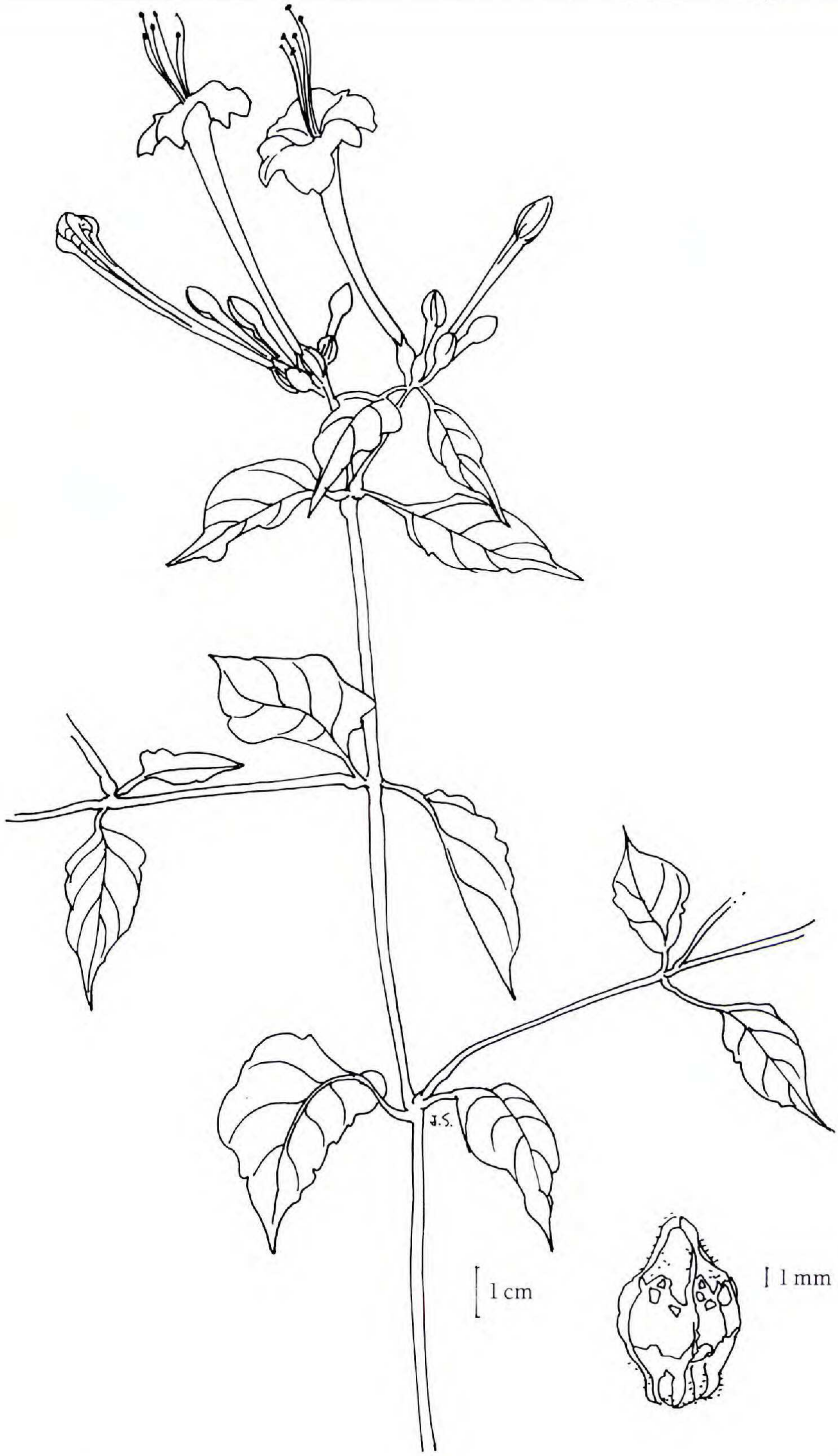

FIG. 8. *Mirabilis gracilis* habit and details from holotype showing: upper leaves and flowers with an enlarged detail of the anthocarp.

Herb. Clifford 53, Mirabilis 1[eta] (LECTOTYPE: BM! designated by Le Duc, in Regnum Veg. 127:67.

Mirabilis odorata L., Cent. Pl. 1:7. 1755. *Mirabilis dichotoma* L., Sp. Pl. 252. 1762. (The reference Amoen. Acad. 4:267 in the original description, is a citation of the reprint of the original description of *M. odorata*). *Jalapa dichotoma* Crantz, Inst. Rei Herb. 2:266. 1766. Crantz references the illustration on p. 90 of Clusius, Rar. Pl. Hist., pt. 2. 1601. He makes no references to specimens examined. This is possibly meant to be a nov. comb. of *M. dichotoma*. *Jalapa undulata* Moench, Methodus Suppl. 196. 1802. (Moench reference to *M. dichotoma* L.). *Mirabilis jalapa odorata* (L.) Heimerl, Bot. Jahrb. Syst. 21:616. 1896. TYPE: MEXICO. 240.1. (LECTOTYPE here designated: LINN). Original material includes the specimen 240.1 which was annotated *M. odorata* by Linnaeus. He later crossed through this annotation and added *dichotoma*, the superfluous 1762 name.

Nyctago mirabilis J.St.-Hil., Expo. Fam. Nat. 1:212, t. 37. 1805. TYPE: not located, if any. Illustration t. 37 published with the original description here designated as lectotype.

Mirabilis pedunculata Stokes, Bot. Mat. Med. 1:311. 1812. In his protologue Stokes mentions a garden grown plant and makes reference to *M. jalapa* L., Sp. Pl. 252. 1762. TYPE: cultivated garden plant, collector and location unknown.

Mirabilis divaricata Lowe, Trans. Cambridge Phil. Soc. 17. 1831. TYPE: cultivated and escaped garden plant on the islands of Madeira and Porto Santo, 1831. No collections were cited. If Lowe actually collected a voucher, then the specimen is probably at BM or K.

Mirabilis procera Bertol., Novi Comment. Acad. Sci. Inst. Bononiensis 3:15. t. 1. 1839. *Mirabilis jalapa* var. *procera* (Bertol.) Choisy in DC., Prodr. 13:428.1849. TYPE: cultivated plant (HOLOTYPE: BOLO?; LECTOTYPE here desiginated: illustration t. 1 in lieu of a specimen).

Mirabilis planiflora Trautv., Bull. Acad. Imp. Sci. Saint Petersbourg 6:216. 1840. *Mirabilis jalapa* var. *planiflora* (Trautv.) Choisy in DC., Prodr. 13:428. 1849. TYPE: cultivated plant, Kiev Botanical Garden. (HOLOTYPE: KW).

Trimista laevigata Raf., Autik. Bot. 1:12. 1840. TYPE: not located, if any. Rafinesque did not cite a specific collection. He did mention plants from Central America and "In particular one plant with characteristics that blend in with *Nyctago jalapa.*" Originally published as *T. levigata*, undoubtedly a printing error.

Mirabilis ambigua Trautv., Linnaea 15: Lit. Ber. 97. 1841. *Mirabilis jalapa* var. *ambigua* (Trautv.) Choisy, in DC. Prodr. 13:428. 1849. TYPE: cultivated plant, Kiev Botanical Garden, 1840 (HOLOTYPE: KW).

Mirabilis jalapa subsp. *ciliata* Standl., Contr. U.S. Natl. Herb. 12:368. 1909. TYPE: MEXICO. OAXACA: valley of Oaxaca, 1 Oct 1894, *Smith 791* (HOLOTYPE: MO!).

Mirabilis jalapa subsp. *lindheimeri* Standl., Contr. U.S. Natl. Herb. 12:368. 1909. *Mirabilis jalapa* var. *lindheimeri* (Standl.) Standl., Rhodora 38:405. 1936 *Mirabilis lindheimeri* (Standl.) Shinners, Field & Lab. 19:173. TYPE: U.S.A. TEXAS. Comal Co.: New Braunfels, Jun 1846, *Lindheimer 158* (LECTOTYPE here designated: MO!). Several Lindheimer sheets exist at MO, some of these annotated by Standley; but these are variously dated and apparently reflect a collage of collections. I have selected one of the sheets annotated by Standley as a lectotype.

Mirabilis jalapa subsp. *volcanica* Standl., Contr. U.S. Natl. Herb. 12:367. 1909. TYPE: MEXICO. DISTRITO FEDERAL: Pedregal (lava beds), valley of Mexico, 19 Aug 1896, *Pringle 6433* (HOLOTYPE: MO!; ISOTYPES: GH!, US!).

Herbaceous or suffruticose perennials, erect, 0.5–1.0 m high, much branched, roots tuberous. Stems slender or stout, glabrous, puberulent or rarely short-villous, sometimes viscid. Mid-stem leaves: petiole slender, 0.3–5.0 cm long; blade 4–14 cm long, 2.0–8.5 cm wide, thin, bright-green, glabrous or rarely puberulent, ovate-deltoid, broadly ovate, ovate-oblong, or rarely lance-ovate, base subcordate to truncate and asymmetrical, apex acute to attenuate, margin usually ciliolate. Inflorescences terminal glomerate many-flowered cymes subtended by numerous reduced leaves. Involucre campanulate, 7–15 mm long, glabrous, puberulent, or short-villous, lobes longer than tube, linear-lanceolate to lance-ovate, acute to attenuate, margin usually ciliolate; ultimate peduncles 1–2 mm long or wanting. Perianth 3.0–5.5 cm long, purplish-red, white, yellow, orange, or variegated, glabrous or sparsely villous, tube 2–5 mm in diameter, gradually dilated upward, the limb 2.0–3.5 cm broad, lobes shallow and broadly rounded. Stamens same length as perianth or occasionally exserted 1–2 cm beyond the perianth, white or the same color as perianth. Anthocarp dark-brown or black, elliptical, obovoid, oval to round, 7–9 mm long, 5 angled, warty or rugose, glabrous or puberulent, base truncate. Chromosome number n = 29 (Kruszewska 1961).

Phenology.—Flowers from May to November, or year round in cultivation in areas that receive no freezing temperatures. Flowers open in the evening around 4 p.m. and close the following morning.

Distribution (Fig. 9).—In Mexico found cultivated in most villages and towns, though often seen as escaped, persisting long after abandonment. Selected strains of *Mirabilis jalapa* have become ubiquitous weeds through out the tropical and subtropical areas of the world. Altitudes mainly 100–3000 m.

Representative specimens: MEXICO. **Chiapas:** Mpio Ocosingo, ruins of Yaxchilan, on banks of Río Usumacinta, *Breedlove 33906* (TEX); San Juán Chamula, *Santiz-Ruiz 970, 829* (TEX). **Distrito Federal:** Pedregal, *Pringle 6433* (F, MEXU, NY, UC); Pedregal, *Lyonnet 129* (G, MEXU, MO, NY); Xochimilco, *Ventura 1579* (MEXU, NY, RSA). **Chihuahua:** Mojarochic, *Knobloch 5289* (F); Mpio Tuxtla Chico, Monte Grande, *Ventura & Lopez 1656* (MEXU, NY); Amatenango del Valle, *Breedlove 14444* (LL, MICH, NY); between San Richardo & Ocezucuantla, *Nelson 2987* (G). **Colima:** Rancho El Jabali 22 km NNW of Colima at Jalisco line, Hacienda San Antonio NW of Lago El Jabali, *Garcia et al. 8208* (RSA, TEX). **Durango:** vicinity of City of Durango, *Palmer 630* (F, GH, MO, NY, UC); Mpio de Santiago Papasquiaro, 3.5 km W of La Soladad, 11 km NW Santiago Papasquiaro, *Diaz 824* (NY); Mina la Amparo 6 km NW of Las Higueras, Mpio de Rodeo, *Torres et al 4225* (RSA). **Guanajuato:** near Guanajuato, *Kenoyer 1755* (G). HIDALGO: Río Tula, Ixmiquilpan, *Moore 3369* (G); Rd N of Mineral (Real) del Monte, *Straw & Gregory 1126* (MICH, RSA). **Jalisco:** Valle de Guadelupe, Hwy 80, *Le Duc & Sydor 42* (MEXU, TEX); 3 mi N of Tapalpa, *Walker 78H40* (NY); Mpio Tuxpan, near Colima, *Fuentes 551* (MICH). **Mexico:** Texcoco, *Runyon 1362* (TEX); Temple of Quetzalcoatl, *Barkley et al.*

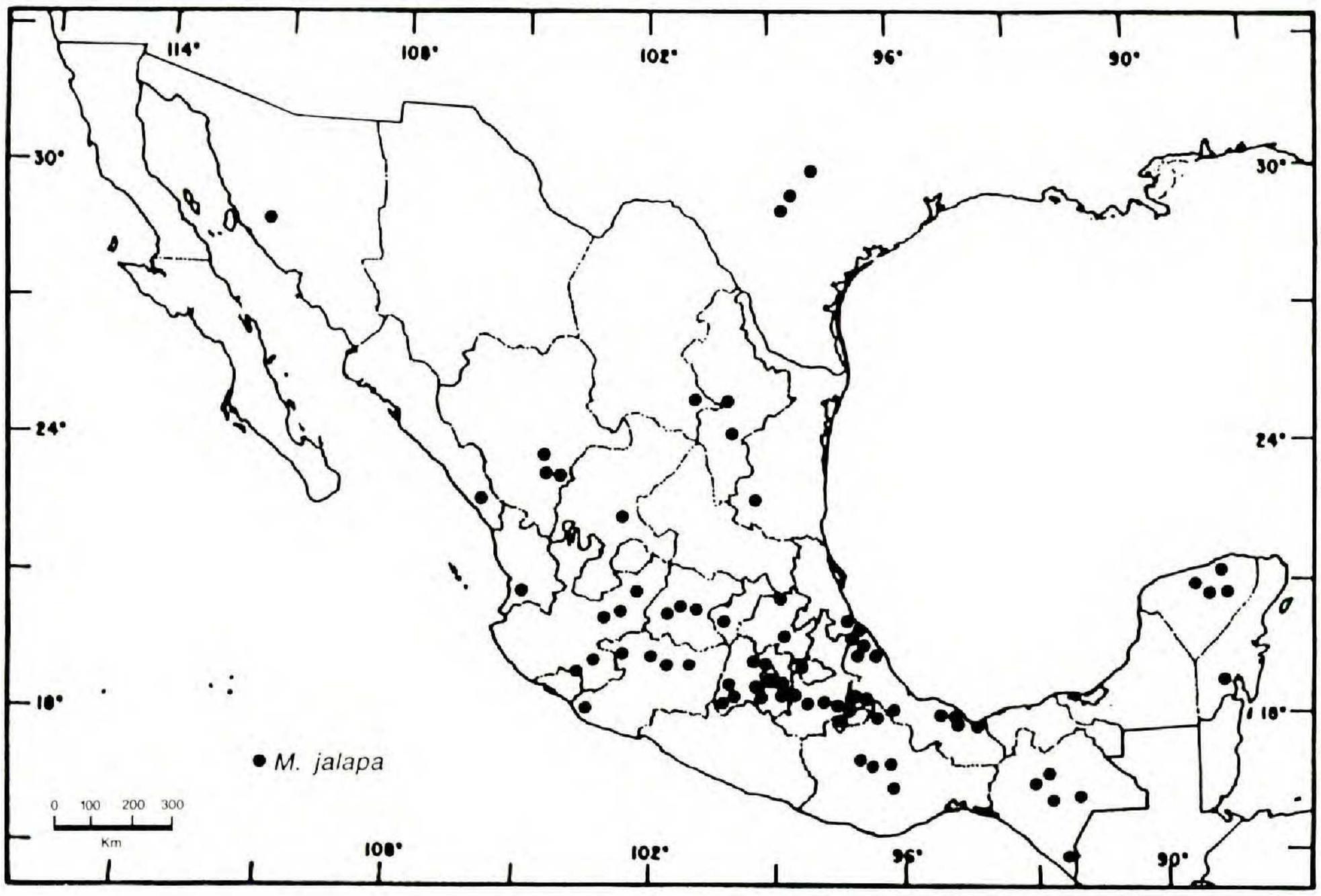

FIG. 9. Distribution of *Mirabilis jalapa* in Mexico and Texas.

7259 (TEX); Hwy 54, 6 mi N of Ixtapan del Sal, *Le Duc & Sydor 94, 96* (MEXU, TEX); Molino de la Flor, Texcoco, *Matuda 18936* (F); Mpio Temascaltepec, Tejupilco, *Hinton 4385* (G, MICH, NY). **Michoacan:** ca. 4.5 mi E of Maravato, *Soule 2472* (TEX); Patzcuaro, near Hotel Don Vasco, *Le Duc 14* (TEX); Hwy 14 Patzcuaro to Morelia, *Le Duc & Sydor 90, 91* (MEXU, TEX); 5 mi W of Cd Hidalgo, *Sauer 1110* (UC). **Morelos:** Along trail from town of Tepotzlan to ruins, *Ayers & Scott 111* (TEX); Cuernavaca, pyramids of Teopanzolco, *Leon MX001* (RSA). **Nayarit:** near Tepic, *Rose 2131* (US). **Nuevo Leon:** Hacienda Pabillo, Galeana, *Taylor 116-B, 116-a* (F, TEX). **Oaxaca:** Valley of Oaxaca, *Smith 791* (F, NY); 5.5 km adelante de San Pedro Jocotipac, Dist. Cuicatlán, *Salinas 4335* (TEX); 10 mi W of Mitla, *Rowell et al 17M485* (TEX); Hwy 175, village of Guelatao, *Le Duc & Sydor 127* (TEX); Yegul, *Le Duc & Sydor 109* (TEX); Monte Alban, in the ruins, *Le Duc & Sydor 107* (TEX); Yanhuitlán at Dominican Monastery, *Le Duc & Sydor 106* (TEX). **Puebla:** Tehuacan 4 km al E de Azumbilla, *Sanchez-Ken 252* (TEX); Meseta de San Lorenzo, *Salinas F-4010* (TEX); Puebla, *Arène s.n.* (NY); San Luis Tultitlanapa, *Purpus 3375, 3522* (UC); Tehuacán, *Chaing et al. 2364* (RSA, TEX). **Queretaro:** Querétaro, *Arsène & Agniel 10526* (F, MO). **San Luis Potosi:** Mpio San Antonio, Tanjasnec, *Alcorn 3332* (TEX); 2 mi S of rte. 70 on road to Zaragosa, *Moran 7650* (MICH, RSA). **Sinaloa:** near Mazatlán, *Rose et al. 13767* (US). **Sonora:** Las Tierritas de El Temblor, Sierra El Tigre, *White 3400* (G, MICH). **Tabasco:** Mpio Huimanguillo, El Arenal, *Ventura 20043* (GH). **Tamaulipas:** 54 mi S of Cd. Victoria, Hwy 85, *Wilson 12278* (TEX). **Tlaxcala:** Tlaxco, *Azcárraga s.n.* (TEX). **Veracruz:** Hwy 125 to Jalapa, junct. with rd to Jalcomuco, *Le Duc & Sydor 159* (TEX); Mpio Altotonga, *Dodds 48* (MICH, NY); Mpio Perote, Tolalco, *Ventura 9163* (LL, MICH); Baños del Carrizal, *Purpus B5494* (UC); Biological Stat. Los Tuxtlas, *Gomez-Pompa 4613* (G); Vista Hermosa, Jilotepec, *Ortega 579* (F); Coatepec, *Pedraza & Ortega 297* (F). **Yucatan:** Izamal, *Gaumer 548* (F); Chichen Itzá, *Steere 1479* (F, MICH); Xocén, Mpio Vallodalid, *Acosta 238* (RSA).

Zacatecas: 10 mi W of Fresnillo on rd to Valparaiso, E of Santa Cruz 15 km, *Anderson & Lskowski 3587* (G, MICH, NY,US).

U.S.A. TEXAS. **Comal Co.:** New Braunfels, *Lindheimer 1103* (TEX). **El Paso Co.:** El Paso, *White 13* (TEX). **Travis Co.:** Austin, *Ferguson s.n.* (TEX).

Mirabilis jalapa is an exceedingly variable species, typical of a horticulturally important plant. Emmart (1940) shows that *M. jalapa* was cultivated by the Aztecs for its medicinal properties and for its showy fragrant flowers, long before the Spanish conquest of Mexico. Collections of *M. jalapa* were introduced into England within 75 years of the Conquest. By the time of Linnaeus (1753, Species Plantarum), the plant had been in cultivation in Europe for about 200 years. The specimens from which the species was described were those of cultivated plants. The numerous early synonyms are a result of attempts to seggregate the various cuultivated strains. Considerable propagation of the species had been done and many plants were well established in Aztec gardens before the Conquest (i.e., prior to 1521). In all my field work in Mexico, I have never seen any population that was not in cultivated or formerly cultivated areas (herbarium collections from remote areas ascribed to *M. jalapa* have on closer examination proved to be misidentified.) It is questionable whether there is any extant population that represents a true wild progenitor. Today, distribution of the species, in Mexico, encompasses all areas which were part of the Aztec empire and sphere of influence, particularly around ancient ruins. It is also dominant in the towns and cities established by the Spanish during the colonial period.

Names applied to putative hybrids between *M. jalapa* × *M. longiflora*

Mirabilis hybrida Lepeletier, Ann. Mus. Natl. Hist. Nat. 8:481. 1806. TYPE: Cultivated in the garden of M. Lepeletier, 1806. Apparently no voucher collection was made. Lepeletier's plant was grown from seed received from M. Fabus d'Attichy of Champagne, France, who found a single natural hybrid in his garden in 1802.

Mirabilis jalapa var. *oaxacana* Heimerl, Notizbl. Bot. Gart. Berlin-Dahlem 11:450. 1932. TYPE: MEXICO. OAXACA: ca. the city of Oaxaca, 1842, *Franco s.n.* (HOLOTYPE: W destroyed, PHOTOHOLOTYPE: F!; ISOTYPE: F!). The holotype was destroyed during the war in 1945, pers. comm., Harald Riedl, Director W. There is a photograph of the holotype and fragmentary material at F. The name *Mirabilis oaxacae* Heimerl is a nomen nudum which appeared in Beitr. Syst. Nyctag. 20. 1897, and is therefore not valid.

Considering the site from which the above referenced entity was obtained, and its apparent intermediate morphology, it is presumed to be of hybrid origin. The foliage resembles *M. jalapa*, but the floral characters resemble those of *M. longiflora* var. *longiflora*. It differs from both, in having an obovoid anthocarp with prominent ridges and warty areas. The anthocarps of *M. longiflora* var. *longiflora* are warty throughout, with indistinct ridges, while those of *M. jalapa* are ovoid or elliptical.

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APPENDIX

Additional Specimens Examined

Abrigo, R. s.n.(10)
Alcorn, J. 1401, 2973(10)
Arguelles, E. 1083(5b), 1145(5b), 2648(10)
Arsène, G. s.n., 1675(10)
Ascencio, M.A. 74(10)
Avila, S. 135(10)
Balls, E. B 5494(10)
Barkley, F.A. 14/a521(5b), 16024(5b)
Barneby, R.C. 5112(5b)
Bartlett, H.H. 12381(10)
Beals, J.M. s.n. (5b)
Benito, S. 21(10)
Bingham s.n. (5b)
Blakley, E.R. B-567(5b)
Blumer, J.C. 2190(5b), 2205(5b)
Bossé, G. 7860(10)
Bonilla, R. & E. Monsalvo 30(10)
Bourgeau, M. 61(10)
Brandegee, T.S. s.n.(2)
Breedlove, D. 10439(10), 14643(10), 47494(10)
Burger, W. & T. Antinio 10939(10), 10855(10)
Bush, B.F. 1209(10)
Bustillo, S. 219(10)
Cabrera, E. & O. Tellez 2398(10)
Caec & Seler 53(10)
Caldron, S. 1800(10)
Calzada, J. 7575(10)
Calzada, J.F. et al. 6315(10)
Campos, A. & G. Toriz 3209(7a)
Carlson, M.C. 109(10)
Castrejón, J. 6(10) 23(10)
Chiang, F et. al. 12267(5b), 9551F(5b)
Conzatti 136(10)
Correll 33672(5b)
Correll, D.S. & I.M. Johnston 19952(10), 20192(5b)

Cory, V.L. 9410(5b), 52390(10)
Coues, E. & E. Palmer 168(5b)
Croat, T. 44151(10)
Crutchfield, J. R. 2120(5b)
Cruz-Cisneros, R. 722(10)
Darrow, R.A. et al. 1282(5b)
Davidson, A. 753(5b), 855(5b)
Diaz, I. 395(10)
Diego, N.P. 68(10)
Dillon, M. et al. 1833(10)
Dunn, D. et al. 23305(10)
Dziekanowski et al. 1968(10)
Edwards, & Eaton s.n.(10)
Elias, T. et al. 9060(5b)
Engelman s.n.(5b)
Epling, C. & Stewart s.n.(5b)
Ferris, R.S. & C.D. Duncan 2519(5b), 2579(5b)
Fisher, G.L. 2113(10)
Flores et al. 1713(10)
Gandara, J.M. & J. Dorantes 146(10)
Garcia, E. s.n.(5b)
García-Saucedo 2589(10), 2635(5b)
Gaumer, G.F. 1843(10), 1842(10), 1843(10), 548(10)
Genelle, P. & G. Fleming 886(10)
Gentle, P. 814, 815, 832(10)
Gentry, H.S. 212(5b), 1911, 588M(10), 672M(10), 10993(1)
Gloyd, L. 14527(5b)
Gomez-Santiz, F. 185(10)
Gonzalez, G. 15(10)
Gonzalez-Medrano 7339(4)
Gonzalez, V. 53(10)
Gooding, L. 548-58(5b); 273-62(5b)
Graham, H.W. s.n.(5b)
Grant, V. 586(10)
Greene, E.L. s.n.(5b); 12511(5b)
Greenman, J.M. & M.T. 5777(10)
Gregg, J. s.n., 344, 231(10)
Guzman, M. & D. Castro 1406(10)
Guzman, R. 881(1)
Hansen & Nee 1718(10)
Hanson, C.A. 507(5b), 503(5b)
Harde Le Sueur 613(5b)
Harker & Mellowes 168(10)
Harrison, G.J. & T.H. Kearney 5818(5b)
Heller, A.A. 1881(10)
Hernandez A. C. 621(10), 5(10)
Hernandez, C. et al. 171(10)
Hernandez, H. 28(10)
Hinkley & Warnock 46821(5b)
Hinkley s.n., 3168, 129(5b)
Hinton, G., et al. 20491(5b), 4356(1), 10297(7a)
Hinton, G.B. 4577(10), 4742(10), 1333(10), 4644(10), 6554(10), 631(10)
Holzinger, J.M. s.n.(5b)
Hood, J.T. s.n.(5b)
Hynes, M. s.n.(10)
Illescas, M. & O. Sparza 59(9)
Inzunza, F. 74(10)
Janzen, D. s.n.(10)
Jermy, G. s.n.(10)
Jimenez A., R. 0005(10), 00038(10)
Jones, M.E. s.n. (5b)
Jones, W.W. 194(5b); 386(5b); 178(5b); 256(5b)
Kelly, I. 984(10)
Kenoyer, L.A. s.n., A600(10)
King, R.M. & T. Soderstrom 4616(10)
Kunze 39(5b)
Kusche, J. s.n.(5b)
Lavin, M., et al. 4850(9)
Laughlin, R. 734, 2828(10)
Le Duc, A. & M. Sydor 75(10), 45(10), 46(10), 74(10), 158(10), 127(10), 90(10), 171(10), 42(10), 159(10), 47(10)
Le Duc, A. et al. 255(7b)
Leavenworth, W.C. 911(5b)
Lehto, E. & T. Reeves P12426(5b)
Lemmon s.n. 2867(5b)
Lindheimer 567(10)
Loew, D. s.n. (5b)
Loomis, H.F. 7267(5b); 1267(5b)
Lopez, R. & J. Villarreal 902(5b)
Lot, A. 333(10)
Luckow, M. et al. 13238(5b)
Lundell, C.L. 876(10)
Lyonnet, E. 985(5a)
Mac Daniels, L.H. 688(10)
MacDougall, T. s.n. (7a)
Mainland & Barkley 14T770(5b)
Makrinius, E. 853(10)
Martinez, E. et al. 19902(10)
Martinez-Calderon, G. 1431(10), 1758(10), 1539(10), 1531(10)
Massey, J. & W. Hess 1791(5b)
Matinez, E.M. 1287(1), 363(10)
Matuda, E. 621(10), 21086(5a)
Mayfield, M. et al. 131(5b)
Mc. Dougal, D.T. s.n.(5b)
McDowell, T. 938(10)
Mearns, E.A. 682(5b); 2359(5b), 2052(5b)
Medellin L., F. 404(10)
Medina, M. 2101(10)
Mendoza, A. s.n.(10)
Messer, E. 72/54(10)
Metcalfe 432(5b); 855(5b); 1187(5b)
Millspaugh, C.F. 36(10)

Moldenke, A.L. & H.N. 29743(10)
Montellano, H. 25(10)
Moore, R.C. 48(5b)
Moreno, P. 867(10), 6456, 6339(10), 6276(10), 4754(10), 6373(10)
Moreno G., S. 245(10)
Mulford, I. 717(5b)
Murrieta G., Y. 46(10)
Nee, M. & G. Diggs 24565(10)
Nelson, E.W. 1314(10)
Nevling & Gomez-Pompa 2212(10)
Nicolas s.n. (10)
Nuñez, J. 5262(10)
Orcutt, C.R. 4122(10)
Ortega et al. 1257(10), 1955(10)
Ortega, R.V. 579(10), 313(10), 1956(10), 1957(10), 1870(10)
Ostero, J. M 16(10)
Pachero, M. 8(10)
Palmer, E.J. 631(10)
Palmer, J. 29561a(10), 31838(5b)
Parks, H.B. Rx1315(10), 1312(10)
Parry, C. & E. Palmer 775(10)
Peebles, R.H. et al. 2641(5b); 2785(5b)
Pedraza & Ortega 297(10)
Pedraza, R.A. 284(10)
Pennell, F.W. s.n.(4)
Pennington, C.W. 184(5b), 600(5b), 63(5b)
Phelps, A. 73(5b)
Pinkava, D.H. et al. P12426(5b)
Powell, A. M. et al. 1454(5b)
Powell, A.M. & S.A. 4944(5b)
Price, W.W. s.n.(5b)
Purpus, C.A. 10584(10) 49(5a)
Ramos, C.H. 285, 108(10), 283(5a)
Rebolledo Velez, A. s.n.(10)
Reverchon, J. 1586(10)
Reyes S., J. 236(10)
Richter, L. s.n.(10)
Riskind, D.H. & T.F. Patterson 1818(5b)
Robbins, S.B. 6258(10)
Rosas, M. 875(10)
Rose, L.S. 65115(10)
Rothnoch, J.T. 359(5b)
Rowell, C.M. et al. 17M668(10)
Rubio, 330(10), 1235(9)
Runyon, R. 5743(10) s.n.(10)
Rusby, H.H. 350(5b)
Rzedowski 19082(9), 29377(5b), 19326(10), 19082(10), 25(10)
Salinas T., A 4495(10), 4743(10)
Sanders, A.C. et al. 8367(10), 8208(10)
Sandino, J.C. 328(10)
Santiz-Cruz, E. 705(10)
Sartwell s.n. (5b)
Saunders, J.L. s.n.(10)
Saynes V., A. 819(4); 430(4), 902(4)
Schery, R.W. 103(10)
Schiefer, H.P. 110(10)
Servin 462(9)
Sessé & Mociño, 5407(10), S402(1)
Setchell s.n.(5b)
Seymour, F.C. 3478(10), 3394(10)
Shelton, M.G. 107(5b)
Shreve 5023(5b)
Smith 518(5b)
Smith, C.E. & S. Kitchen 4819(7a)
Smith, L. 773(10)
Smith, J.D. 6737(10), 2019(10), 1731(10)
Smith, R.F. M563(5b)
Sohmer, S.H. 9398(10)
Solbrig & Ornduff 4514(10), 4513(10)
Solheim & Reisfield 1445(10)
Solís, F. 245(10), 27(10), 74(10), 99(10)
Soria, G. s.n.(10)
Soule, J. 2345(10)
Soya, D. & A. Grijalva 167(10)
Spellenberg, R. 3832(5b)
Spellenberg, R. & N. Zucker 8242(5b)
Standley, P.C. & E. Padilla V. 3168(10), 3750(10)
Standley, P.C. 88758(10), 70775(10), 64284(10), 64613(10), 22066(10), 23758(10), 77821(10), 76502a(10), 75427(10), 78914(10), 20584(10), 19287(10)
Stevens, W.D. & B.A. Krukoff 7026(10), 3449(10)
Stevenson, J. & T. Bradley 3354(10)
Stewart, R.S. 2501(5b)
Steyermark, J. 34449(10), 42173(10)
Streets, R.B. s.n.(5b)
Swallen, J.R. 2526(10)
Templeton, B. 8741(10)
Thurber, G. 90(5b); s.n.(5b); 212(5b)
Tlapay Ubierna 1088(10)
Ton, A.S. 2899(10)
Torres, R. 101(10)
Toumey 395(5b)
Tun Ortiz, R. 788(10)
Valerio, M. 1304(10)
Vazquez, L. 758(10)
Vazquez, M. V-1973(10)
Vazquez, T. V. 97(10)
Ventura, A. 1759(10)
Ventura, E. & Lopez 2485(10), 493(10), 1309(10), 6102(10), 6100(10)
Ventura, E. 790(10)
Ventura, F. 9854(10), 4065(10), 11844(10), 1031(10), 19188(10), 1132(10)

Vibrans, H. s.n.(10)
Vidaurri, G. 33(10)
Villarreal, J.A. & M.A. Carranza 1734(5b)
Von Rozynski, H.W. 185(10)
Warnock T. 633(5b), 2324(5b)
Waterfall, U.T. 15539(5b) 12891(5b)
Waterfall, U.T. & C.S. Wallis 13480(5b), 13760(5b)
Wagenbreth, 643(10)
Weller, S. 654(10)
West, R. H-6, I-14(10)
Whiffin, T. & E. Rodriguez. 212(10)
Wilcox, T.E. s.n.(5b)
Wieder et al. 200, 33(10)
Wilkinson, E.H. 134(10), 1900(10)
Wilson J. et al. 8566(5b)
Wilson, J. 12281(10)
Wolff, S.E. 223(10)
Wooten, E.O. s.n.(5b)
Worthington, R.D. 13439(5b)
Wright, C. s.n. (10), 408, 595(5b), 1073(5b,) 1072(5b)
Young, s.n.(5b)
Yuncker, T.G. et al. 5663(10), 8795(10)
Zelaya, H. M. 2315(10)
Zola, M.G. 548(10), 783(10), 760(10)

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